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ABSTRACT

This training unit on forcible entry is part of a 17-unit course package written to aid instructors in the development, teaching, and evaluation of fire fighters in the Wisconsin Fire Service Certification Series. The purpose stated for the 8-hour unit is to familiarize the fire fighter with the appropriate times for using forcible entry, the methods used to accomplish the job, and the proper use of forcible entry tools. An instructor's guide sheet provides this information: introduction to the topic, instructor preparation, length of unit, methods of instruction, testing, equipment and facilities required, recommended visual aids, and references. Following a list of unit objectives, a lesson plan outlines the main teaching points and states the preferred teaching method, cites the reference and page number(s) where the information is to be found, and indicates the necessary handouts. Other content in the unit include a unit quiz, answer key to the quiz, and handouts (graphs, student worksheets, informational material, and forms).
(YLB)

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FIRE SERVICE CERTIFICATION SERIES

UNIT FSCS-PF-12-80

FORCIBLE ENTRY

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FORCIBLE ENTRY

Prepared by:

Paul F. Pribyl
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INTRODUCTION

This section is designed to familiarize the candidate with the various needs for forcible entry, the methods used to accomplish the job, and the proper use of forcible entry tools to effect forcible entry.

During this unit, the instructor should attempt to familiarize the candidate with all available forcible entry tools, emphasizing at all times, the safety procedures that must be followed in their use, not only for the protection of the operator, but other firefighters or bystanders.

Situations which are commonly encountered which require forcible entry should be illustrated. The methods best suited for gaining entry in the various situations should be discussed and/or demonstrated, and problems that may be present in the situations should also be discussed.

INSTRUCTOR PREPARATION

Carefully study the objectives to determine the goals that have been set for the firefighters upon completion of this unit.

Review the lesson plans and if necessary, consult the references listed.

Develop suitable audio-visual aids, provide training area and necessary tools and equipment to effectively teach this unit.

LENGTH OF UNIT

Classroom Work 4 hours

Practical Skills 3 hours

Evaluation and Testing 1 hour

Lecture and Illustration
Discussion and Demonstration

The lecture and illustration methods will be used to a lesser extent than the demonstration and participation methods.

The discussion or conference method will prove useful when the instructor wishes to assess the candidates previous experiences or conduct a question and answer period.

Suggested methods and techniques are listed under Instructor's Notes on the lesson plans. For further information consult Fire Service Instructor Training, IFSTA #303, 3rd ed., pp. 71-83.

TESTING

At the end of this unit, a written quiz of five or more questions will be given.

EQUIPMENT AND FACILITIES REQUIRED

Classroom with necessary audio-visual equipment.

Suitable forcible entry simulations or mock-ups.

Forcible entry tools, axes, pike poles, sledge hammers, closet hooks, halligan tool, claw tool, detroit door opener, kelly tool, wrecking bars, power saws, etc.

Chop-out panels, window frames for glass and screen wire

If available, building scheduled for demolition.

RECOMMENDED VISUAL AIDS FOR THIS UNIT

Forcible Entry Practices - Robert J. Brady Company, Washington, D.C.

REFERENCES

1. Peige, J., Ed., Forcible Entry, Rope and Portable Extinguisher Practices, #101 IFSTA, Stillwater, 6th ed., 1978 pp. 7-100
2. Peige, J., Ed., Essentials of Fire Fighting, #200, IFSTA, Stillwater, 1st ed., 1977, pp. 185-207

OBJECTIVES

All objectives in this unit are to be met according to the material contained in the International Fire Service Training Association Manuals #101 Forcible Entry, Rope and Portable Extinguisher Practices and #200 Essentials of Fire Fighting.

To satisfactorily complete this unit, the fire fighter must attain a grade of 70 or higher on the written quiz and successfully complete the practical skills tests.

NFPA STANDARD 1001

FORCIBLE ENTRY

Fire Fighter I

3-2 Forcible Entry

- 3-2.1 The fire fighter shall identify and demonstrate the use of each types of forcible entry tool used by the authority having jurisdiction.
- 3-2.2 The fire fighter shall demonstrate the method and procedure of properly cleaning, maintaining and inspecting each type of forcible entry tool and equipment.

Fire Fighter II

4-2 Forcible Entry

- 4-2.1 The fire fighter shall identify materials and construction features of doors, windows, roofs, floors, and vertical barriers found in the area of the authority having jurisdiction; and shall also identify dangers associated with each in an emergency situation.
- 4-2.2 The fire fighter shall demonstrate the method and procedure of forcible entry through any door, window, ceiling, roof, floor, or vertical barrier specified by the authority having jurisdiction.

COURSE: FIRE SERVICE CERTIFICATION SERIES

LESSON: FORCIBLE ENTRY

EQUIPMENT NEEDED: SLIDE, OVERHEAD OR MOVIE PROJECTORS, SCREEN

TRAINING AIDS: SLIDES, TRANSPARENCIES, FILMS, TEXTS

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. p. 7-9 #101
Ref. pp. 185-186 #200

4-2 Forcible Entry

4-2.1

GENERAL INFORMATION

Although there are specific places through which firefighters usually force entrance into a building, a general knowledge of how buildings are constructed is also essential.

It is important for firefighters to be familiar with the various trade terms in construction so that they can better judge both where and how to force entrance.

Various tools and devices best suited for forcible entry procedure must be thoroughly understood by fire fighters.

GENERAL BUILDING CONSTRUCTION

Most modern buildings have continuous masonry foundations of

concrete

brick

stone

upon which the building rests.

The foundation walls which support frame construction may extend well above the ground.

Exterior walls may be constructed of

masonry

masonry veneer

metal

or

wood frame.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA,
pp. 185-207

Ref. pp. 7-9 #101
Ref. pp. 185-186 #200

4-2 Forcible Entry

4-2.1

Refer to Handout #1

GENERAL BUILDING CONSTRUCTION

Masonry walls are most desirable from a fire protection point of view.

They are usually 8 to 12 inches thick depending on the particular material used.

Masonry veneered walls are essentially frame walls in which the supporting members are wood with the veneer of one layer of brick or stone fastened to the supporting wall with metal ties.

The upright wood supporting members in masonry veneered walls are called "studs" which are usually 2 x 4's spaced at 16 to 24-inch intervals.

The presence of these studs create hollow spaces in the walls through which fire can spread.

Fire Stops should be provided in these hollow spaces.

Frame walls are constructed of wood throughout, with a wood or wallboard sheathing fastened to the studs.

Over the sheathing is fastened the exterior siding, which may be of:

wood clapboards

"board and batten" siding

aluminum siding

asbestos shingles

stucco

or other types of exterior finish.

Frame walls also have hollow spaces in them that are created by the wood studs which should be blocked off with fire stops.

Fire Stops are usually short pieces of 2 x 4's that are placed in

walls

ceilings

between the studs at each floor level

at the upper end of stud channels in the attic

and sometimes in the center section above electrical outlets and switches in the wall.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry. Rope
& Portable Extinguisher
Practices #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. pp. 7-9 #101
Ref. pp. 185-186 #200

4-2 Forcible Entry

4-2.1

GENERAL BUILDING CONSTRUCTION

These wooden fire stops cut off the draft within the walls and help prevent the spread of fire and smoke.

When fire stops are not used or the spaces are not filled with noncombustible insulation, it is possible for a fire which originated in the basement to spread throughout the walls of the building before it is discovered.

Modern type construction uses top and bottom plates on the studs which create a section of wall before erected.

This method will prevent fire from traveling from floor to floor but it still can travel the height of the partition or wall.

Dwelling roofs are usually built of wood supporting members called rafters to which the roof sheathing is fastened.

The top roof covering material is then applied to the roof sheathing.

Roof coverings may be:

wood shingles

composition shingles

composition roofing paper

tile

slate

or a built up tar and gravel surface.

The roof covering is the exposed part of the roof, and its primary purpose is to afford protection against the weather.

The selection of a proper roof covering is important from a fire protection standpoint because it may be subjected to sparks and blazing brands if a nearby building should burn.

A more thorough development of roof construction and the types of roofs found on industrial and mercantile buildings will be found in the section on opening roofs.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Parcious, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-186

Ref. pp. 7-9 #101
Ref. pp. 185-186 #200

4-2 Forcible Entry

4-2.1

Refer to Handout #2

GENERAL BUILDING CONSTRUCTION

Some terms which are used in this unit are:

Tile Flue Liner	Joist
Ridge Board	Box Sill
Metal Flashing	Plate
Rafter	Anchor
Roof Dacking	Foundation
Shingles	Basement Floor
Ceiling Joist	Footing
Top Plate	
Eave Closure	
Wood Siding	
Sheathing	
Stud	
Sole or Sill	
Header	
Rigid Insulation and/or Sheathing	
Plaster or Sheet Rock	
Brick Veneer	
Finish Floor	
Rough Floor	
Cross Bridge	

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. pp. 9-21 #101
Ref. pp. 187-189 #200

3-2 Forcible Entry

3-2.1

FORCIBLE ENTRY TOOLS

There is a variety of tools on the market which have been devised to make forcible entry possible.

Such tools are often designed primarily for the fire service.

Every fire department should set up its own rules concerning the care of forcible entry tools.

The development of an appreciation for the tools which the firefighters work should instill in them a desire to keep them in condition for immediate use.

The factor of safety, more than any other factor, should determine the method by which forcible entry tools are carried.

When carried in the hands, precautions should be taken to protect the carrier, other firefighters and bystanders.

Some fire departments provide special belts in which some of the more commonly used forcible entry tools can be carried.

In atmospheres which could be explosive or around spills of flammable liquid, EXTREME CAUTION should be taken in the use of power and hand tools that may cause arcs and sparks.

When tools are not in use, they should be kept in their properly designated place on the apparatus.

AXES AND HATCHETS

Firefighters use the

Flat Head Axe

and

Pick Head Axe

The flat-headed axe is more adaptable to striking but the pick-headed axe is more versatile for fire fighting.

Special hatchets with a pick head are carried and used by some fire departments.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. p. 10 #101
Ref. p. 187 #200

3-2 Forcible Entry

3-2.1

3.2.2

FORCIBLE ENTRY TOOLS

AXES AND HATCHETS

A fire axe should be carried so that there will be little danger of an injury.

An axe or any other edged or pointed tool should NEVER be carried on the shoulder.

Firefighters should carry the axe head close to their bodies and thus afford protection to themselves as well as any bystanders.

Carrying the axe:

Method 1. Hold the handle of the axe in the left hand, with head pointing forward, blade down, against the left side of the body, with the gloved right hand grasp and cover the pick head of the axe.

Method 2. Hold the handle of the axe in the left hand in an upright position, with the blade pointing to the rear and the pick head to the front, with the gloved right hand grasp and cover the pick head.

Method 3. In fire departments where "Truckmen's Belts" are provided, don the belt with snap and ring in front of body and slip handle of axe thru belt at side, slide to middle of back for carrying.

In the first two methods of carrying the axe the point of the pick is shielded and the sharp blade protected or pointed away from the body.

Maintenance

If the blade is extremely sharp and the body of the blade is ground too thin, pieces of the blade may be broken out when cutting gravel roofs or striking nails or other materials in flooring.

If the body is too thick regardless of the sharpness of the blade, it is difficult to drive the axe through ordinary objects.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Ropes
& Portable Extinguisher
Parctices, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. p. 11 #101
Ref p. 188 #200

3-2 Forcible Entry

3-2.1

Refer to Handout #3

Ref. p. 12 #101
Ref. p. 189 #200

AXES AND HATCHETS

Maintenance

Medium thickness of the body of the axe is necessary.

The body thickness should be about 1/4 inch at 3/4 inch from the edge, 3/8 inch at 1-1/4 inches, and 1/2 inch at 2 inches from the edge.

The measurements are to be taken at the center of the blade (refer to Handout #3)

The temper should be such that the blade will not bend easily or break off when nails, gravel or other foreign matter is struck.

Care must be used when grinding to prevent heating and the consequent softening of the steel.

The axe should be ground to preserve the body thickness and not merely to sharpen the blade.

After sharpening the blade, it should be rubbed lightly over a stone to take off an extremely keen edge and to lessen the possibility of cutting firefighters who may rub against the blade at fires.

The effectiveness of an axe depends more on its proper usage than on the keenness of the blade.

Rust spots on the metal parts of such tools should be removed with emery paper and the spot covered with a light film of oil.

The shoulder of the handle should be rather thick to prevent breaking should the axe be driven through a floor unexpectedly. The handle grip should be thin to provide elasticity and it should be smooth to prevent splinters.

Wooden handles of axes and other similar tools should be sanded to minimize hand injuries.

After using they should be cleaned with soapy water, rinsed and dried.

To prevent roughness and warping, a coat of boiled linseed oil is recommended for wood handles.

Paint or varnish on the handles tends to blister when exposed to extreme heat.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101., IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. p. 13 #101
Ref. p. 188 #200

3-2 Forcible Entry

3-2.1

AXES AND HATCHETS

MAINTENANCE

Axes and hatchets equipped with fiberglass handles require a minimum of care. During normal usage they will not crack or splinter.

These handles will not absorb moisture, dry rot or warp.

After use , they should be dried with a clean, soft cloth.

PRYING TOOLS

Some examples of prying tools are:

Hux Bar	Halligan Tool	Claw Tool
Kelly Tool	Spanner Wrench	Pry Axe
Crow Bar	Screw Driver	Lowy Quick-Hook
Pickhead Axe		

These tools are very effective in:

- a. breaking locks
- b. opening doors
- c. forcing windows
- d. prying up objects

Prying tools should be used in a manner that will protect the firefighters and others from injury.

Pry tools require very little maintenance. The bit part of a prying tool should have a long narrow taper to permit entrance into narrow spaces, such as doors and windows.

PIKE POLES AND PLASTER HOOKS

Pike poles are useful as pushing and pulling tools. They can be used to open windows, ceilings and partitions.

The plaster hook has two knifelike wings which depress as the head is driven through an obstruction and then when clear reopen or spread outward under the pressure of self-contained springs.

Pike poles and plaster hooks should be carried with the sharp ends toward the front and lowered.

The wooden or fiberglass handles of pike poles and plaster hooks should be cared for in the same manner as previously described for axe handles.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Ropes
& Portable Extinguisher
Practices, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200 IFSTA
pp. 185-207

Ref. p. 14 #101
Ref. P. 189 #200

3-2 Forcible Entry

3-2.1

BATTERING RAM

This forcible entry tool is used to open heavy doors
and breach walls.

The battering ram may be safely carried by two firefighters.

It is designed to be used by two or four firefighters.

There is little maintenance required for this tool.

Metal fragments may protrude from the head of the tool
after it has been used on hard objects like concrete.

These fragments should be filed off, the pick examined
and renewed, and the entire tool repainted if desired.

HAND AND POWER SAWS

Wood and metal hand saws are useful where entry must be
made through wood or light metal.

Power saws can be equipped with carbide tipped blades to
cut metal or light concrete.

Chain saws and saber saws are also useful.

These power saws may be electrical or gasoline and those
which will operate from compressed gas are also available.

HAMMER HEAD PICK AND SLEDGE HAMMER

The hammer head pick serves as a driving device and its long
sharp pointed pick may be used for digging dirt, concrete
or debris.

The hammer head can be used as a sledge although, like the
flat head axe, it does not have as much striking power as
a sledge or maul.

The sledge hammer may be effectively used to break out tile,
deadlights, walls, concrete, terrazzo or to free iron bars
set in masonry.

Several head weights are available.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

Ref. p. 15 #101
Ref. p. 189 #200

3-2 Forcible Entry

3-2.1

METAL CUTTERS

Bolt cutters are used as a forcible entry tool to cut

- a. bolts
- b. cables
- c. hasps

and other objects.

Wire cutters are used to cut wire fences.

Wire cutters for electrical wiring MUST be an approved insulated type used with approved insulated type glove.

CAUTION DO NOT exceed current rating for the type of cutter. Whenever possible call utility company for emergency service personnel to cut and remove power lines.

CUTTING TORCH

An acetylene cutting torch is classified as a burning tool and is very useful to enter an area blocked by heavy iron bars or iron plates.

These units are available as a back pack, and they can be carried on fire apparatus as a special forcible entry or rescue tool.

CAUTION Do not use in areas where flammable liquids or explosive vapors are present. Use care in operating equipment in the presence of combustible materials.

HYDRAULIC TOOLS

Hand-Pumped Hydraulic Jack and Spreader

Hand-pumped hydraulic tools are in frequent usage in many fire departments.

The hydraulic principle allows firefighters to apply greater force to the entry task facing them.

Various attachments do not cut away any crumpled metal as a saw or air chisel does, but push, spread and brace damaged material or lift up to 20 tons with some units.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

3-2 Forcible Entry

3-2.1

Ref p. 16 101
Ref. p. 189 #200

HYDRAULIC TOOLS

Hand-Pumped Hydraulic Jack and Spreader

The force used to push, pull or lift is supplied by a hand-operated hydraulic pump. Different capacities range from 4 to 20 tons.

Heavy duty hoses transport the pressure to the working attachments. Each 5 to 6 inch stroke of the pump handle only gradually increases the hydraulic pressure, but this feature makes the unit especially effective.

The tool is frequently used to force entry whenever a locked door or window provides a seam or protrusion against which the tool can apply its force.

The three different units with capabilities of 4, 10 and 20 tons are all operated in a similar hand-pumped manner.

Along with the different pumps are many different attachments.

Wedging and spreading attachments are used whenever a slight crack or space exists which can be widened for access.

Locked doors provide just such a space for widening.

The pulling ability can be used with chains hooked one end to a solid structural member and the other end to the blocking material. As the pressure increases, all of the force is exerted against the material and pulls it away.

Attachments are also available for jacking, bracing or shoring.

For such uses a wide base must be provided.

Several hydraulic units can be used together to combine their power for a large surface object to be lifted.

Two units can also be used with twisted wreckage to pull away material at one particular location while pushing on another.

A pinching attachment can use the powerful pressure to squeeze and cut heavy cables or other obstructions.

Other useful tools that might be included with these kits include a bail hook to pick off chrome window moulding and a heavy-duty knife to cut rubber gaskets on windshields and other glass.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

3-2 Forcible Entry

3-2.1

Ref. p. 17 #101
Ref. p. 189 #200

Ref. p. 18 #101
Ref. p. 189 #200

HURST POWER RESCUE TOOL

The Hurst Power Rescue Tool features two hydraulically operated arms which can be opened or closed to spread, pull or lift up to 10,000 pounds.

Nicknamed the "jaws of life", this tool has been more commonly been applied to extrication rescue work.

However, its value in forcible entry should not be overlooked.

The hydraulic principle is similar to that of the hand-pumped unit, but the Hurst tool uses a gasoline engine to increase the hydraulic pressure.

With the two arms closed together forming a wedge, the tool can be inserted at the door seam or between window bars, and triggered to spread the opening.

It takes only 40 seconds to spread the arms to 32 inches apart under full load.

By anchoring one arm to a secure post or the fire apparatus frame, the pulling capability can be used to pull bars away or remove a large item from a doorway.

With special pinching-cutting head attachments, metal and wood strips can be severed.

The Hurst tool is now available in a smaller size for ease of handling, but either can be operated by one person in any position. A thumb pressure trigger controls the position of the arms.

CAUTION although the operating jaws are not spark producing, the gasoline powered engine should not be used in an area where flammable liquids have been spilled or where the air is otherwise potentially explosive. An AC or DC EXPLOSION PROOF electric motor would be a helpful option.

NOTE: There are similar types of this tool available from other manufacturers as well such as the LUKAS TOOL.

AIR CHISEL

Numerous forcible entry cutting tasks can be handled efficiently with a tool called the air chisel or air hammer.

INSTRUCTORS NOTES

TEACHING POINTS

REF: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

3-2 Forcible Entry

3-2.1

Ref. p. 19 #101
Ref. p. 189 #200

AIR CHISEL

Powered by

- a. compressed air from a breathing apparatus cylinder
- b. from a compressor

or c. from some air-brake systems

the air chisel cuts by applying thousands of short-distance impacts per minute against a metal object.

Because of the short distance, the impacts of the chisel head against metal do not produce the numerous sparks as with a circular saw against metal.

Specially designed kits include various chisel heads for different cutting needs and each one can be quickly replaced because of their screw-in bases.

A long flat chisel is often used for general cutting.

A short flat chisel for tight spots.

A separate medium-length panel-cutting chisel.

This chisel can quickly move through sheet metal and is constructed with an angle to the shaft so the hands stay clear of the jagged cut edges.

Other attachments are available for pinching or hammering.

It is easily placed in service particularly if the air tank supply is constantly connected.

A regulator provides the correct working pressure which may vary from 100 to 300 psi depending on the manufacturer and the type of metal being cut.

A standard 30 minute breathing apparatus cylinder should last for at least 6 minutes of continuous operation.

Tests with automobiles have shown that the entire roof could be removed in less than that time.

Heavier entry barriers can still be cut, but increased compressed air supplies will be necessary.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

3-2 Forcible Entry

3-2.1

Ref.p. 20 #101
Ref. p. 189 #200

Don't Forget

The common hand tools found
around the house - you
may need them at a fire.

different types of:

hammers
screw drivers
pliers
wrenches

AIR CHISEL

Compressors can be installed in specialized apparatus to
allow continuous use of the air chisel.

Hose lengths of 50 feet are available.

Longer lengths are possible in extreme situations, but
longer runs will result in loss of air pressure unless
a compressor is used.

Special connectors can also be used to adapt some regulators
to nitrogen bottles.

Other adaptors can be used with Scuba tanks or carbon
dioxide tanks.

CAUTION DO NOT EVER use OXYGEN or ACETYLENE to power
an air chisel.

JET-AXE

The Jet-Axe is a relatively new device which uses the
energy of a few ounces of explosives applied in a controlled
direction to achieve a piercing effect against an
obstacle to entry.

Jet-Axe can cut a neat initial hole through

- a. steel doors
- b. fire doors
- c. roofs
- d. concrete or brick walls
- e. steel decks
- f. wharfs

or other material.

Then either an inserted arm can unlock a door or the initial
hole can be enlarged with other forcible entry tools.

The following steps basically demonstrate the use of
the Jet-Axe.

1. After removing Jet-Axe from container, place it into
position.
2. Attach Jet-Axe to surface and punch out outer cover.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Ropes
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

3-2 Forcible Entry

3-2.1

Ref. p. 20 #101
Ref. p. 189 #200

JET-AXE

3. Remove the metal firing line and firing device
KEEPING THEM SEPARATE.
4. Extend firing line to full length and holding ONLY
the firing device, detonate the Jet-Axe.

CAUTION Before attempting to use the Jet-Axe, the fire
fighters must be thoroughly trained in the correct and
safe procedures for the operation of this piece of equipment

NOTE: The manufacturer of JET-AXE recently announced that
this item has temporarily been removed from distribution
and sale.

Mention of the tool has been included, in spite of an
uncertainty about future marketing decisions, because it
is so unique.

PENETRATING SPEAR NOZZLE

Ideally the fire fighter would like to use the necessary
forcible entry techniques to get inside building to directly
attack the fire.

Where this is not possible in a reasonable length of time,
in some circumstances the firefighter can still make an
entry at least large enough to apply a stream of water on
the fire.

One of the quickest ways to do this is with a penetrating
spear nozzle.

A pointed steel head and strong handles allow the 5-foot
long spear to be forced or hammered through many types of
doors, and walls or through partitions, roofs, and vehicle
exteriors. Upholstered and baled materials are also
handled efficiently with this tool.

The penetrating spear nozzle is 1-1/2 inches in diameter.

It is easily connected to a hose line and locked with a
quarter-turn ball valve.

The lightweight unit can also be used with foam.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Ropes
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100
Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

Ref. p. 23 #101
Ref. P. 190

Emphasize the importance
of this point which will
aid in the investigation
of the fire.

FORCING DOORS

Various types of doors are used for entrance to buildings
or areas within a building.

The construction features of some doors render them
extremely difficult to force, and entry may be more
easily made by some other means.

From a firefighter's standpoint of forcible entry, doors
may be classified as:

Swinging

Revolving

overhead

sliding

Regardless of the class of door, firefighters should try
the doorknob to make sure it is locked BEFORE force is
used.

REMEMBER - TRY BEFORE YOU PRY

Such a simple thing as trying the door or window before
attempting forcible entry may seem to be an automatic
reaction

BUT IS IT ?

Experience has shown that in the excitement of a fire
situation and the press of time inexperienced personnel
might incorrectly assume that a door must be locked,
particularly at night.

If the door is locked, examine it to determine which way it
swings and which method forcible entry will prove most
effective,

and

ALSO TO DETERMINE IF ILLEGAL ENTRY HAS BEEN MADE PRIOR TO
THE ARRIVAL OF THE FIREFIGHTERS.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Ropes
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

Ref. p. 24 #101
Ref. p. 190 #200

Some exterior slab doors
on industrial and mercan-
tile buildings are solid
core slab doors.

WOOD SWINGING DOORS

Three general kinds of wood swinging doors are:

panel

slab

ledge

Front doors in residences may be either panel or slab
with glass panels in the upper area. Some panels of
glass are held in place with mouldings which may be
pried off to remove the glass.

Residence doors generally open inward; in this they
differ from outside doors in public buildings, where
they should open outward for emergency exit reasons.

Slab doors may be constructed as either:

Hollow Core

or

Solid Core

The "hollow core" door is made up of an assembly of wood
strips formed into a grid or mesh.

These strips are glued within the frame, forming a rigid
and strong core.

Over this framework and grid are glued several layers
of plywood veneer paneling.

The purpose of the hollow core grid is to decrease the
weight and cost of the door.

Most exterior slab doors that are found on newly constructed
residences will be hollow core slab doors, while those on
older residences may be solid core.

"Solid core" means that the entire core of the door is
constructed of solid material.

Some solid core doors have a core built up of tongue and
groove blocks or boards which are glued within the frame.

Other solid core doors may be filled with a compressed miner
substance that is fire resistant. In either case the door
is solid with a plywood veneer covering.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Ropes
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

Ref. p. 25 #101
Ref. p. 190 #200

Refer to Handout #5

Refer to Handout #6

LEDGE DOORS sometimes called batten doors are found on:

Warehouses - Storerooms - Barns and other areas where a
finished door is not necessary.

They are made of built up material, and are locked with
either;

surface locks

hasps and padlocks

bolts or bars

Hinges on ledge doors are generally of the surface type
with stationary pins and are fastened to the door and facing
with screws or bolts.

STOPPED AND RABBETED DOOR JAMBS

A door jamb includes the sides of the doorway opening.

Door jambs for wood swinging doors may be either

rabbeted jambs

or

stopped jambs

The rabbeted jamb is one into which a shoulder has been
milled from a solid piece to permit the door to close
against the provided shoulder.

Stopped door jambs are provided with a wooden strip or door
stop that is nailed inside the jamb against which the door
closes.

A stopped jamb is not as secure as a rabbeted jamb. This
stop may be easily removed with most prying tools.

METAL SWINGING DOORS

Metal swinging doors may be classified as:

Hollow Metal

Metal Covered

Tubular

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

Ref. p. 26 #101
Ref. p. 191 #200

NOTE: Avoid entry thru this
type of door or go
thru cylinder lock
with a K-TOOL or Lock
Puller.

METAL SWINGING DOORS

Metal swinging doors are generally more difficult to
force because of the manner in which the door and door
jamb are constructed.

This difficulty is also more acute when the jamb is set
in masonry.

It is generally considered impractical to force metal doors.

The framework of hollow metal doors is constructed entirely
of metal. The jambs are hollow and are fastened to the
walls by specifically designed metal anchors.

Metal doors are constructed essentially as hollow metal
doors except that there may be a wooden core or metal ribs
over which the metal covering is placed. The paneling
sometimes consists of metal covered asbestos.

The structural design of tubular metal is of seamless
rectangular tube sections.

A groove is provided in the rectangular tube for glass or
metal panels.

The tube sections form a door with unbroken lines all in
one piece and are sometimes found on exterior openings of
the more recently constructed buildings.

The tubular doors are hung with conventional hardware
except that the balance principle of hanging is sometimes
used.

That particular operating hardware consists of an upper and
lower arm connected by a concealed pivot.

The arms and pivots are visible from the exterior side
only, and from the interior side the balanced door resembles
any other door.

Tubular aluminum doors with narrow stiles are also quite
commonly used.

The panels of these doors are generally glass but some
metal panels are used.

Tubular aluminum doors are comparatively light in weight,
strong, and are not subject to much spring within the
aluminum frame.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

Ref. p. 27 #101
Ref. p. 192 #200

METAL SWINGING DOORS

Some of the construction features of aluminum tubular doors that make them difficult to force are:

- a. Butt hinges, not easily forced
- b. Vinyl glazing (can be removed from one side of door if on the exterior side)
- c. Stiles and rails usually 1/8 inch in thickness
- d. Lock has a throw of more than 1-inch

If at all possible, bypass this type of door when making forcible entry.

SWINGING DOOR LOCKS AND FASTENERS

Internal door locks for swinging doors consist of a bolt or latch that protrudes from the door into a metal striker plate, which is mortised into the door jamb.

This bolt or latch is usually part of the lock assembly or it may be entirely separate, but, in either case, the jamb must be sprung far away from the door for enough room to permit the bolt to pass the striker plate during forcible entry.

In buildings of masonry construction this is extremely difficult to do.

In such cases the bolt or latch may be sawed through with a hacksaw or reciprocating saw.

However, some bolts have a free turning hardened steel pin or roller concealed in them that resists sawing.

Some special installations have two latches, one at the top of the door and one at the bottom.

Such door locks are also exceedingly difficult to force.

A record of the type of door and how it is locked can be valuable to firefighters if such information is collected during inspection surveys.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 28 #101
Ref. p. 192 #200

BREAKING GLASS

In some cases less damage may be done by breaking a small pane near the lock, through which the door may be opened from the inside.

REMEMBER - TRY BEFORE YOU PRY

CAUTION: DO NOT BREAK GLASS WITH THE HANDS !!!

WHEN BREAKING GLASS ALWAYS !!

1. Strike the tool at the top of the pane.
2. Keep the body off to one side.
3. Keep the hands above the point of impact.
4. Wear FULL PROTECTIVE CLOTHING INCLUDING EYE PROTECTION.
5. On a windy day, break glass with the wind at your back.
6. Remove all glass from frame to prevent injuries to firefighters and damage to hose and other materials that may pass through the opening.

TECHNIQUES OF FORCING SWINGING DOORS

The method used to force a swinging door is determined first;

by how the door is hung

and secondly;

by how it is locked

Before attempting to force any door, a firefighter should check to see whether or not the door is locked, TRY BEFORE YOU PRY, and whether or not the hinge pins can be removed.

Before any door is opened or forced;

the conditions of the building should be observed

and

hose lines should be made available for use.

The firefighter should then feel the door for heat by using the back of the ungloved hand. The temperature of the door may indicate whether a back draft is possible when the door is forced or opened.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref p. 29 #101
Ref. p. 193 #200

Refer to Handout #7

BREAKING OR PULLING THE LOCK

TRY BEFORE YOU PRY

The lock itself can often be removed or destroyed with less damage and later expense than might occur if the door is forced open.

A few small, handy tools are useful when the through-the-lock method is chosen.

These tools are among the least expensive that can be carried on fire apparatus, and some are also small enough to be carried in a coat pocket.

Useful tools for going thru the lock include the K-TOOL, ket tools, vise grips and lock puller.

One way to break a lock is to physically pull the cylinder out of the door.

The new K-TOOL is especially useful in pulling all types of lock cylinders whether;

rim

mortise

or

tubular

Using the K-TOOL

Step 1. Force the K-TOOL behind the ring and face of the cylinder until the wedging blade takes a bite into the cylinder. (Light blows of a hammer help this forcing)

Step 2. The K-TOOL is positioned correctly when the blades are engaged into the body of the cylinder, thus eliminating the likelihood of breaking off the ring and face of a cylinder made of white metal.

Step 3. Insert the forked end of a Malligan or other prying tool in the front metal loop of the K-TOOL and remove the cylinder.

When a cylinder is found close to the threshold or jamb, the narrow blade side of the tool will usually still fit behind the ring. A close clearance situation will often be found on a glass sliding door, but only a 1/2 inch of clearance is needed.

When the cylinder is removed, use a key tool in the hole to move the locking bolt to the open position.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 30 #101
Ref. p. 193 #200

Refer to Handout #8

BREAKING OR PULLING THE LOCK

Using the LOCK PULLER

The lock puller is a different tool which accomplishes the same job as the K-TOOL.

Its jaws are also forced around and behind the protruding rim of the cylinder.

Then the curved head and long handle are used to provide the leverage to remove the cylinder.

On the other end of the tool, a chisel head is used when necessary to gouge out the wood around the cylinder for a better bite of the working head.

The lock puller is slightly more damaging to the door than a K-TOOL but it will rapidly pull a cylinder and sometimes the fire situation will require quick entry at whatever damage to the door.

Step 1. Hook the end of the lock puller directly above the ring of the lock escutcheon at an angle of about 45 degrees.

Step 2. Using the flat head axe or other suitable tool, drive the lock puller behind the ring and cylinder face.

Step 3. Lift up the straight end of the lock puller to pry the cylinder from the door.

Step 4. Insert either the straight or bent end of the key tool into the hub of the lock and turn.

If for any reason this fails, insert the straight end of the lock puller through the hole and drive the lock off the door using an axe or sledge.

Using Vise-grip Pliers

When time is not a critical factor and the firefighter desires a less-damaging forcible entry, consider the use of vise-grip pliers. It has many uses in the fire service, so it should be common equipment.

It can be locked onto a protruding cylinder and turned counterclockwise to remove the cylinder.

Again the key tool completes disengagement of the lock.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 31 #101
Ref. p. 194 #200

Refer to Handouts #9-10

Emphasize this point:

In each case, remove the
cylinder, examine it,
and duplicate the action
of the stem or cam with
the corresponding part of
the correct key tool.

KEY TOOLS

A key tool is used in forcible entry after a lock cylinder
has been pulled.

It is inserted into the cylinder opening and is manipulated
to trip the inside locking mechanism.

There are two types of key tools:

Regular

and

5/32 Inch square

The regular key tool is flat and tapered at both ends, with
one end bent.

The bent end is called the cam end because of the type of
cylinder hole it is used in.

The other end is called the flat or stem end.

Regular key tools are used on all locks except police locks.

The other kind which is used for police locks, is called
5/32" square because of its dimensions. Its length and
bending are similar to the regular key tool.

To determine which end of either key to use, the fire
fighter must examine the cylinder that was removed from the
door.

For Example:

The pulled cylinder is from a rim lock and has a length of
flat stem which trips the lock.

The firefighter would use the flat stem of the regular key
tool to insert into the opening.

The back of the mortise cylinder would show that a cam
movement opened the lock.

The firefighter would use the bent cam end of a regular
key tool.

On police locks, the stem of the cylinder is square
shaped and the 5/32" square key tool would be used.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 32 #101
Ref. p. 194 #200

Refer to Handout #9

Ref. p. 32 #101
Ref. p. 194 #200

Refer to Handout #10

Refer to HANDOUT #11

TRIPPING A MORTISE LOCK

When a mortise cylinder has been pulled and the cam end of a regular key tool is chosen, the next step is to establish a "6 o'clock" position to orient the later steps.

The 6 o'clock position will not always be straight up and down as on a clock, but can be to the side if the locking bolt is in that direction. Tempered glass doors may feature this condition.

Figures A & B of Handout #9 show where the relative 6 o'clock position would be.

Using it as a reference, insert the correct end of the key tool parallel to the 6 o'clock position and perpendicular to the door with the cam end pointing to either 5 or 7 o'clock.

Try to depress the deadlock mechanism at one position, if it doesn't work try the other.

If found at 5 depress it and slide to 7 o'clock position.
If found at 7 depress and slide to 5 o'clock position.

TRIPPING THE RIM LOCK

When a rim lock cylinder has been pulled, use the flat tapered stem end of the regular key tool to replace the cylinder stem.

If it is a police lock, use the square end of the 5/32" key tool to replace the square stem.

Insert the key tool while holding it parallel to the ground and perpendicular to the door.

Push it in until it reaches the back of the lock and turn the tool to retract the lock. (See Fig. 3, Handout #10.

Some locks will open when turned clockwise, others must be turned counterclockwise.

REMEMBER: The square stem on a police lock requires the use of the 5/32" tool.

If for any reason the key tool will not fit into the back-plate of the lock or it will not turn to disengage the lock, place the point of a Halligan tool or other long headed tool in the cylinder hole.

Using a short handled sledge, drive the lock of the back-side of the door.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 34 #101
Ref. p. 194 #200

Ref. p. 35 #101
Ref. p. 194 #200

Refer to Handout #12

DRILLING A LOCK

Another method that may be used to open a locked door equipped with a pin cylinder lock is to destroy the security of the lock without completely destroying the lock.

The way to do this is to drill the lock in such a way as to remove the pins.

First, center punch a mark halfway between the top of the keyway and the edge of the plug.

Using a 3/16" drill bit in a heavy duty drill, drill a hole in the plug.

Drill approximately 1-1/3" into the plug.

Remove the drill and turn the plug with a screwdriver or other suitable tool inserted into the keyway.

It may be necessary to redrill the back pins and springs the drop down into the keyway if great resistance is encountered in turning the plug to unlock the door.

FORCING DOORS THAT OPEN TOWARD THE FIREFIGHTER

The door hinges and jamb may be checked to determine the direction the door swings.

If the door opens toward the firefighter, it must be forced in a certain manner.

Several forcible entry tools may be used for this operation.

The techniques of their use are similar and are illustrated in Figures 1-4 of Handout #12.

Fig. 1 Insert the blade of the prying tool between the door and the jamb near the lock.

Fig. 2 Force the blade in and against the rabbet or stop by working and pushing on the tool. Hammer the prying tool if necessary to push it as far as the stop.

Fig. 3 Apply leverage on pry bat away from the door to move the door and jamb apart.

Fig. 4 Pull the door open. If necessary insert another tool in the opening and continue to pry until the lock has cleared the keeper.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 5-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 36 #101
Ref. p. 194 #200

Ref. p. 36 #101
Ref. 195 #200

Refer to Handout #13

TEACHING POINTS

FORCING DOORS THAT OPEN TOWARD THE FIREFIGHTER

Different prying tools may be used for this operation.

These methods may work very well on ordinary and inexpensive doors, but variations may be needed to force more sturdy doors.

Two tools may be used together to open a door.

If two tools are used, insert both tools between the door and the jamb,

one just above the lock

and

the other just below the lock

By alternately prying with one and catching a better bite with the other, more force can be applied.

FORCING DOORS THAT OPEN AWAY FROM THE FIREFIGHTER

Swinging doors that open away from the firefighter present greater difficulties because the stopped or rabbeted jamb blocks ready access to the lock.

If the door is in a stopped frame, the blade of the tool may be forced between the stop and the jamb to pry it clear.

Then the tool can be inserted between the door and the jamb to pry it clear.

Then insert the tool between the door and the jamb near the lock.

By separating the door away from the jamb, the firefighter may spring it sufficiently to permit the bolt to pass the keeper.

Under certain conditions, it may be better to remove the stop completely.

The techniques of forcing a door with a stopped jamb that opens away from the fire fighter is illustrated in Figures 1 thru 5 of Handout #13.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref. Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 37 #101
Ref. p. 195 #200

Refer to Handout #13

Refer to Handout #14

FORCING DOORS THAT OPEN AWAY FROM THE FIREFIGHTER

- Fig. 1 Bump the cutting edge of the tool against the stop to break the paint or varnish so the blade can be inserted.
- Fig. 2 Further loosen the stop at the lock location or remove the stop completely.
- Fig. 3 Force the blade between the door and the jamb.
- Fig. 4 Make the initial pry after the blade is past the stop and pressing on the door edge near the lock.
- Fig. 5 With a full bite behind the door, pry the door away from the jamb until the bolt passes the keeper.

If the door opening away from the firefighter is in a rabbeted jamb, which cannot be separated as the stopped jamb, it can possibly be forced using two tools.

Prying against the door with one tool should open a crack between the door and the rabbet into which the blade of the second tool can be inserted.

After the blade of the second tool has been forced well into this opening between the door and the jamb, the door may be pried sufficiently to permit the bolt to pass the keeper.

Even with two tools, forcing this type of door construction may be quite difficult.

The technique of forcing doors that open away from the firefighters in rabbeted jambs is illustrated in Figures 1 thru 4 of Handout #14.

- Fig. 1 Lay the blade of the tool flat against the door and insert the blade between the rabbet and the door.
- Fig. 2 With short pries of one tool, work the blade of the second tool between the door and the jamb.
- Fig. 3 Work or hammer the blade well into the opening.
- Fig. 4 With a full bite behind the door, pry the jamb away from the door until the bolt passes the keeper.

INSTRUCTORS NOTES

TEACHING POINTS

REF: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 38 #101
Ref.p. 196 #200

Ref: p. 39 #101
Ref. p. 196 #200

DOUBLE SWINGING DOORS

Double swinging doors may be forced with most pry tools by prying the two door sufficiently apart at the lock to permit the lock bolt to pass the keeper.

Sometimes a moulding of wood or other material is placed over the crack between the doors. This moulding must be removed before forcible entry can be made.

Swinging double doors are sometimes secured with a bar on the inside that is drooped into securing stirrups or hooked to the inside wall.

To gain entry:

If the opening between the doors is sufficient to permit the insertion of a flat tool or object, a bar can sometimes be lifted or bumped from the stirrups.

When this process is not possible, doors secured with a bar may need to be battered in if entry at this point is essential.

It may be possible, however, to cut a hole in a door panel or break glass and remove the bar.

REMEMBER: TRY BEFORE YOU PRY

TEMPERED PLATE GLASS DOORS

FORCING TEMPERED GLASS DOORS AND WINDOWS

Tempered glass doors should only be broken AS A LAST RESORT if the building is locked and there is no other means of access.

Although a tempered glass door may be locked at the center, top, or bottom of the door, its resistance to shock and its rigid characteristics make it almost impossible to spring with forcible entry tools.

Tests that have been conducted warrant the basic conclusion that firefighters should use every other means of forcible entry before deciding to gain entrance through an opening that is blocked by a tempered plate glass door.

Tempered plate glass door panels are considerably more expensive than any other glass-paneled doors of similar size.

Each door is, in a sense, custom-built and the cost of installation varies.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1 4-2.2

Ref. p. 40 #101
Ref. p. 196 #200

4-2.1

4-2.2

FORCING TEMPERED GLASS DOORS AND WINDOWS

The time necessary to prepare a replacement and install it may be considerably longer than for other type of doors.

Tempered plate glass doors frequently have narrower plate glass wing panels installed at the sides of the doorway opening.

These panels should be regarded with the same precaution as the doors.

When ever it is necessary to break tempered plate glass. such breakage can be accomplished more easily by the pick point of a standard fire axe or other sharp pointed instruments of hardened steel.

Blunt faced instruments of unhardened or untempered metals have relatively little breaking effect when used in striking tempered plate glass.

CAUTION SHOULD BE USED WHEN BREAKING TEMPERED PLATE GLASS

Tempered glass will not fall out like ordinary plate glass when broken but because of internal stresses,

may explode

with the fragments dispersing in a direction perpendicular to the glass pane.

This can be a serious hazard to firefighters who must:

wear full protective clothing and eye protection

when breaking tempered glass.

Some departments use a shield made of a salvage cover and two pike poles placed as near the glass as possible and strike the glass thru this protective shield.

Fragmentation of the tempered plate glass is in small granules with relatively blunt points and dull edges, while plate glass breaks into much larger sharp and pointed pieces.

Plate glass fragments have sufficient weight and force to cause serious cuts or stabbing injuries.

It is generally agreed that there is much less safety hazard involved in breaking a closed and locked tempered plate glass door panel then there is in breaking ordinary plate glass of the same size if it is done safely.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 41 #101
Ref. p. 202 #200

LEXAN DOOR PANELS AND FORCING TECHNIQUES

A current trend in the construction industry is the use of Plexiglass and other thermoplastics in place of glass windows.

"LEXAN" is an example of one such polycarbonate which has seen wide application as a glass substitute for its ability to withstand abuse from vandalism or weather.

LEXAN is:

250 times stronger than safety glass

30 times stronger than acrylics

50 percent lighter than glass

43 percent lighter than aluminum

and

is classed as self-extinguishing.

Lexan is available in thicknesses ranging from 1/8-inch to 1-inch with the most common thicknesses being:

1/8- to 1/2-inch

Various tests have been conducted by departments across the country to gain information on the best way of forcing entry into openings containing lexan.

The tests have utilized standard forcible entry equipment,

Pick Head Axes

Oxyacetylene Cutting Torches

Reciprocating Type Saws

Circular saws

These tests along with actual field experiences with Lexan during fire situations indicate that a circular saw with a carbide tipped blade is most effective when entry must be made through Lexan.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.2

Ref. p. 42 #101
Ref. p. 202 #200

LEXAN DOOR PANELS AND FORCING TECHNIQUES

CAUTION must be taken in blade selection since a too fine of tooth blade will melt the Lexan and cause the blade to bind.

A blade which is too coarse will cause the blade to slide dangerously over the cutting surface.

A MEDIUM TOOTH BLADE (APPROXIMATELY 40 TEETH) HAS BEEN FOUND TO YIELD THE BEST RESULTS.

It must be reported that during actual fire conditions, even where companies had been made aware of the Lexan characteristics, much difficulty was encountered in ventilating buildings with Lexan windows.

OTHER CONSIDERATIONS TO REMEMBER WHEN FORCING ENTRY
AT SWINGING DOORS

The variety of swinging door types makes the discussion of forcing all of the types more complicated.

As mentioned so far, swinging doors may be;

wood - metal - tempered glass

or the first two types may have a variety of windows in them;

regular glass - wired glass - Tempered glass

or

LEXAN

No matter what conditions are found, the firefighter must choose the quickest entry method or the least damaging method or preferably an efficient way that combines both factors.

Keep in mind the following considerations when forcing entry through doors.

1. A metal door is very hard to force, but glass can be removed and the lock opened from inside.
2. Using an axe to clear wired glass is also better than trying to pry open a metal door. But - is the door even locked ?
3. Expensive tempered glass doors are best opened by removing the cylinder, but some doors make cylinder removal difficult.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 42 #101

Ref. p. 43 #101
Ref. p. 197 #200

TEACHING POINTS

OTHER CONSIDERATIONS TO REMEMBER WHEN FORCING ENTRY
AT SWINGING DOORS

4. If the hinges are accessible, use prying tool to force the pin out of the hinge.
5. Hinges with flat pins are more difficult to remove but are often easier than prying open the door.
6. Some external hinges are designed to prevent removal of the pin. Look for a window.

REVOLVING DOORS

Revolving doors consist of quadrants that revolve around a center shaft.

The revolving wings turn within a metal or glass housing that is open on each side and through which pedestrians may travel as the door is turned.

The mechanism of the revolving door is usually collapsible and panic-proof.

Each of the four revolving wings is held in position by hangars at the top and bottom.

The wings fold from their revolving position to a wide open panic position when the hangars are collapsed.

Some revolving doors will automatically collapse when forces are exerted in opposite directions on any two wings.

All revolving doors DO NOT collapse in the SAME MANNER, and it is a good policy to collect such information when fire department inspection surveys are made.

Three types of collapsing revolving doors are:

THE PANIC PROOF TYPE

The panic-proof collapsible mechanism has a 1/4-inch cable holding the wings apart.

To collapse the mechanism, push or press the doors or wings in opposite directions.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 44 #101
Ref. p. 197 #200

REVOLVING DOORS

THE DROP-ARM TYPE

The drop-arm mechanism has a solid arm passing through one of the doors and a pawl will be found on the door through which the arm passes.

To collapse the mechanism, press this pawl to disengage it from the arm and then push the wing to one side

THE METAL-BRACED TYPE

The metal-braced mechanism is held in position by arms that resemble a gate hook with an eye.

To collapse the mechanism, it is only necessary to lift a hook and fasten it back against the fixed door or wing.

The hooks are on both sides of these doors.

The pivots are, in most cases, cast iron and can be broken by forcing the door with a bar at the pivots.

Revolving doors make be locked in various ways and, in general, they are considered difficult to force when they are locked.

Swinging doors are usually found on either side of a revolving door and large transom lights may be over the doors.

It is usually best to use some other means of entrance when revolving doors are locked.

SLIDING DOORS

Sliding doors are generally considered to be those which can travel either to the right or left of their opening and in the same plane.

Sliding doors are usually supported on a metal track and their side movement is made easier by smaller rollers or guide wheels.

The ordinary sliding door travels into a partition or wall when it is pushed open.

This type of installation is more common for interior openings.

These doors may be forced similarly to the swinging door except that they must be pried straight backward from their lock,

INSTRUCTOR NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 46 #101
Ref. p. 198 #200

TEACHING POINTS

OVERHEAD DOORS

The lock and latch may also be located on only one side,
especially on larger doors.

FORCING THE OVERHEAD FOLDING DOOR.

These doors may be forced by prying upward at the bottom of
the door with a good prying tool, but less damage will be
done and time will be saved if;

a panel is knocked out and the latch is turned from the
inside

or

a pike pole is used to trip the emergency release on
electrically operated doors.

Some of these doors may be locked with a padlock through
a hole at either end of the bar, or the padlock may even
be in the track.

These systems of locking usually make it necessary to batter
the door down with a battering ram or other convenient
ramming device.

This is time-consuming and the door should be passed, and
other means of entrance selected.

Overhead Rolling Doors may be constructed from;

fabricated steel - aluminum or fiberglass

although some doors of this type are made of wood.

These doors may be found on:

Garages

Warehouses

and Service entrances to mercantile and industrial
buildings where positive closures are desired.

They are all similar in structural design and may be
mechanically, manually or electrically
operated.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 44 #101
Ref. p. 197 #200

Ref. p. 45 #101
Ref. p. 197 #200

SLIDING DOORS

From a forcible entry point of view, the sliding patio door presents a problem.

These units consist of heavy duty, full panel glass that is set into a metal or wood frame.

These glass panels are sometimes "thermopane" (two panels of glass with a vacuum space between them), and tempered which adds to their value.

Patio sliding doors usually glide past stationary glass panels instead of disappearing into a wall.

BREAKING THESE PANELS TO GAIN ENTRY IS NOT RECOMMENDED.

Sliding patio doors can be forced open by inserting a wedge tool between the door and the jamb near the lock and prying the door away from the frame.

Lifting the door at the latch side will work in some cases. Let the latch pass its keeper.

Patio sliding doors may sometimes be barred or blocked by a metal rod or special device.

THIS FEATURE CAN BE SEEN FROM THE OUTSIDE AND IT PRACTICALLY ELIMINATES ANY POSSIBILITY OF FORCING.

OVERHEAD DOORS

Doors that open by moving them overhead may be classified into overhead;

folding - rolling - slab doors

Each one will be considered separately for clarity of forcible entry practices.

Overhead Folding Doors may be constructed of:

metal - fiberglass - wood framework with wood or glass panel

From a forcible entry point of view the wood sectional door does not present a serious problem unless it is motor driven or remote controlled.

The latch is usually in the center of the door and it controls the locks which are on each side of the door.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 46 #101
Ref. p. 198 #200

Ref. p. 47 #101
Ref. p. 199 #200

OVERHEAD DOORS

The barrel on which the door is wound, is usually turned by a set of gears that are located near the top of the door on the inside of the building.

This feature makes the door EXTREMELY DIFFICULT TO FORCE and therefore, entrance should be gained at some other point and the door operated from the inside.

Overhead Slab Doors are locked similarly to the previously described overhead folding door.

Slab doors may be either;

metal - fiberglass or wood

and unless glass windows are present, it is practically impossible to reach the latch on the inside.

Sometimes it is possible to pry outward with a bar at each side near the bottom. This action will tend to bend the lock bar enough to pass the keeper.

CAUTION: ALL OVERHEAD DOORS SHOULD BE BLOCKED OPEN (UP POSITION) TO PREVENT INJURY TO FIREFIGHTERS IN CASE OF CONTROL DEVICE FAILURE.

FIRE DOORS

Fire doors are used principally to protect openings in division walls and walls of vertical shafts, but for certain exposures they may be necessary for exterior door openings.

Openings for fire doors are classified from "A" to "F" for identification of the various commonly encountered types and the classification is usually erroneously assumed to apply to the fire door itself.

Openings for fire doors are classified as to the character and location of the wall in which they may be situated.

Although classifications exist from "A" through "F", only Classes A and B will be discussed here for clarity only.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 48 #101
Ref. p. 199 #200

FIRE DOORS

Class A openings are those:

which are located in walls separating buildings

or

in walls within a building which separate it into
distinct fire areas.

Class B openings are those vertical communication
enclosures such as:

elevators
stairways
dumbwaiters

which may occur within a building.

Standard fire doors are one of the following types:

horizontal and vertical sliding

single and double swinging

or

overhead rolling

They may or may not be counterbalanced.

There are two standard means of operation for fire doors:

(1) Self-closing doors are those which when opened return
to the closed position

and

(2) Automatic closing fire doors are those which normally
remain open but which close when heat actuates their
closing device.

Fire doors which slide horizontally are generally prefer-
able. They are mounted close and require little floor
space.

Horizontal sliding fire doors are normally open and so
arranged as to close automatically in case of fire.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 49 #101
Ref. p. 200 #200

TEACHING POINTS

FIRE DOORS

Swinging Fire Doors are generally used on stair enclosures and in other situations where they must be opened and closed frequently in normal service.

Swinging Fire Doors that fit into a rabbeted jamb are tighter than sliding fire doors, but the sliding type is more readily made automatic.

Vertical Sliding Fire Doors are also normally opened and so arranged as to close automatically.

They are employed where horizontal sliding or swinging fire doors cannot be used.

Overhead Rolling Fire Doors may be installed where space limitations prevent the installation of other types and they, like vertical sliding doors are arranged to close automatically.

Counterbalanced fire doors are generally employed on openings to freight elevators and they are mounted on the face of the wall inside the shaft.

Fire doors, because of their protective qualities, are generally not considered, as doors that need to be forced.

Fire doors that close automatically need only to be pried open with suitable forcible entry tools.

However, fire doors that are used on exterior openings may be locked and, therefore, the lock must be forced.

CAUTION: FIREFIGHTERS PASSING THROUGH AN OPENING PROTECTED BY A FIRE DOOR SHOULD BLOCK THE DOOR OPEN TO PREVENT ITS CLOSING AND TRAPPING THEM.

Fire doors have also been known to close behind firefighters and cut off the water supply in a hose line.

Stairwell type doors may lock so that entrance cannot be made without a key.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IPSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IPSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 49 #101
Ref. p. 200 #200

See Breaching Masonry
Walls

PROPERTY BARRIERS

Although property barriers are not doors, they are obstacles which firefighters normally encounter as they approach or enter into an area or premises such as hedges and fences.

Other obstacles which may form a lesser hindrance are:

streams - bridges - railroad tracks

Hedges are more frequently found in residential areas.

If possible, go around them. If this is not possible several feet of hedge may have to be removed.

Fences of wood, metal, masonry and woven wire often pose an entrance problem.

The gates on these fences are usually locked with padlock and hasps.

The following methods of forcible entry may be used:

- (1) Pull apart with a claw tool or cut with bolt cutter.
- (2) Twist hasp off using claw or other forcible entry tool.
- (3) Snap the bow of the lock with a hammer.
- (4) Use bolt cutters to cut chains and locks.

A wooden fence may require that several boards be pried off or cut for safe entry to the area.

Woven wire fences may sometimes be cut, but it is recommended that bridging with ladders be accomplished instead.

When cutting wire fences, cut near posts to provide adequate space for fire apparatus.

Caution should be used to see that all strands of wire are secured to the post before cutting the wire.

It is extremely difficult, costly and time consuming to breach masonry fences.

IT SHOULD BE DONE ONLY AS A LAST RESORT.

CAUTION: THE FIREFIGHTER SHOULD BE ALERT TO ANIMALS
CONFINED INSIDE ENCLOSURES.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. P. 50 #101
Ref. p. 189 #200

Ref. p. 52 #101

For further information
contact the Knox-Box Compa
ny in Newport Beach Calif-
ornia.

TEACHING POINTS

POWER TOOLS -
FOR HEAVY-DUTY FORCIBLE ENTRY

The hydraulically operated rescue tools such as the
"Hurst Tool" or the "Lukas Tool" can greatly reduce the
time and effort in effecting forcible entry.

Some of these uses are:

- spreading metal bars and grates on windows
- pulling metal window frames from masonry sills
- popping lock or whole doors
- cutting cables, bars and window posts

and many others.

NON-DESTRUCTIVE ENTRY METHOD

The problem of gaining fast access into a building without
destruction has confronted fire departments for a long
time. Now there is another solution.

The problems presented by numerous locked doors in a single
or variety of fire buildings can be eliminated by the use
of a PUBLIC SAFETY KEY BOX SYSTEM.

The system utilizes a heavy-duty key box station which
is securely mounted on the exterior of a building.

All necessary keys to the building are locked inside the
key box, and only the fire department carries the master
key, one on each apparatus, which opens all the boxes
in the city or jurisdiction.

Security for a single key can be verified by an inventory
after every response or even verified hourly for a
maximum guarantee of security.

The advantages to the owners are less damage from destruct-
ive forcing of doors and faster entry should a fire occur.
After the emergency the building can be relocked easily.

The boxes are mounted 8 to 10 feet above the ground level
which discourages vandalism without unduly restricting
its accessibility for ladder equipped firefighters.

Even if the box can be pried off a wall, the box
construction prevents forcing open the box itself.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 55 #101

Ref. p. 200 #200

Ref. p. 56 #101

OPENING LOCKED WINDOWS

There are many different types and designs of windows through which firefighters must force entrance to perform their duties of rescue and fire extinguishment.

Each type presents a different situation

and

each situation requires a different technique

if forcible entry is to be accomplished through them.

It is often easier to force a window than a door and entrance through a window may permit a door to be opened from the inside.

The types of windows that will be covered in this unit are:

double hung or checkrail

hinged or casement

factory or projected

awning or jalousie

BREAKING GLASS

At fires in windowed structures with locked doors, breaking the glass in the door or window may be the fastest and least costly method of forcible entry.

However, rash window breaking is both unnecessary and potentially dangerous;

- a. released smoke and heat could injure firefighters
- b. falling glass could cause serious injury to personnel
- c. a delayed backdraft situation could develop if coordinated ventilation and hose line readiness did not accompany forcible entry techniques.

Ordinary window glass is relatively inexpensive, but more expensive tempered plate glass windows should be broken only as a final resort.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 57 #101
Ref. p. 192 #200

Ref. p. 58 #101
Ref. p. 201 #200

Refer to Handout #16

BREAKING GLASS

Consider the following points when breaking glass:

- . Wear full protective gear !!
- . Try the window to verify it is locked.
- . Approach the glass from the windward side so that the wind will blow most of the smoke and heat away.
- . Keep hands above the point of impact to prevent broken glass from sliding down the tool handle.
- . Don't approach from directly above.
- . Strike at the top of a pane close to the lock and clear out glass by working downward.
- . Watch for signs of backdraft, such as smoke being sucked back inside the window.
- . Have hose lines ready.
- . Clear all remaining jagged pieces of glass from the frame to prevent injury to personnel or hose lines.
- . Reach in and release the locking mechanism.

CHECKRAIL WINDOWS

Checkrail or double hung windows may be made of either wood or metal, but the construction is quite similar.

They usually consist of two sashes that meet in the center of the window, known as the upper and lower sashes.

These two sashes may be locked together by a latch or bolt on the inside.

Wood checkrail windows are not difficult to pry open if the latch is on the checkrail for the screws of the lock will pull out and the sashes will separate.

Practically any prying tool may be used, such as an axe or spanner wrench:

make the pry at the center of the lower sash if the sashes are locked at the center of the checkrail.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 58 #101
Ref. p. 201 #200

Ref. p. 59 #101
Ref. p. 201 #200

Refer to Handout #16

Ref. p. 60 #101
Ref. p. 201 #200

Refer to Handout #16

TEACHING POINTS

CHECKRAIL WINDOWS

Forcing sash bolt locks in metal windows presents a different problem.

The latch or lock is not likely to give under pry, and excessive damage may be done and more time expended than if the glass were broken near the lock and the window unlocked from the inside.

Wire glass often requires more force to break, and the use of the blade or the pick of the axe instead of the flat part may sometimes prove advantageous.

CASEMENT WINDOWS

Casement or hinged windows are usually made of metal, but wood casement windows are used.

They consist of one or two sashes which are hinged on the side and they swing outward from the opening.

If screens are used, they are located on the inside opposite the direction which the windows swing.

Casement windows are not only latched, but the operating mechanism must be reached to open the window.

The most practical way to gain entrance through casement windows is as follows:

- . Break the lowest pane of glass and clean out sharp edges.
- . Force or cut the screen in the same area.
- . Reach in and upward to unlock the latch and then operate the cranks or lever at the bottom.
- . Remove the screen completely and enter.

PROJECTED WINDOWS

Projected or factory windows are ordinarily made of metal and they may project in or out from an opening.

They may be:

pivoted at the center

or

at the top or bottom.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 61 #101
Ref. p. 202 #200

Refer to Handout #16

PROJECTED WINDOWS

"Projected Out" factory windows swing outward at the bottom and slide down from the top in a groove which is provided for that purpose.

"Projected In" factory windows swing inward at the top and they are usually hinged at the bottom.

Pivoted projected windows are usually operated by a push bar that is notched to hold the window in place.

Screens are seldom used with this type of window, but when they are, they are on the side opposite the direction of projection.

The most practical method of forcing factory-type windows is the same as was previously described for casement windows, except that the crank operated mechanism is not often employed. Break a single glass pane and move handle.

Basement and utility windows are often of the projected window type and they are locked similarly to all other projected windows.

AWNING AND JALOUSIE WINDOWS

Although awning and jalousie windows are often considered to be the same type, there are two main differences that should be considered in a study of forcible entry.

Both types are sometimes referred to as louver windows, because of their methods of operation.

Differentiating factors are:

louver size

and

louver framing

LOUVER SIZE

Awning windows consist of large sections of glass about one foot wide and as long as the window width.

Jalousie windows consist of small sections about four inches wide and as long as the window width.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 62 #101
Ref. p. 202 #200

LOUVER FRAMING

Awning window sections are constructed with a metal or wood frame around the glass panels, which are usually double strength glass.

Jalousie window sections are usually without frames, and the glass is heavy plate that has been ground to overlap when closed.

The glass section of both awning andalousie windows are supported on each end by a metal operating mechanism.

This mechanical device may be exposed or concealed along the sides of the window, and each glass panel opens the same distance outward when the crank is turned.

The operating crank and gear housing are located at the bottom of the window.

Awning oralousie windows are the most difficult of all types to force.

Even with the louvers open, it is obvious there is not enough room between the louvers to permit a person to enter.

Entrance through these windows may be accomplished by the removal of individualalousie louvers by sliding the glass from its support frame.

If this cannot be accomplished, several panels must be broken out to gain entry.

Because of the cost ofalousie windows, these openings should be avoided, if possible.

SCREENED OR BARRED WINDOWS AND OTHER OPENINGS

Heavy wire mesh guards over windows and doors present a serious problem to forcible entry, ventilation and fire fighting practices.

These mesh guards may be permanently installed, hinged at the top or side, fitted into brackets and locked securely.

In either case, forcing wire mesh guards involves considerable time and should be avoided.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 63 #101
Ref. p. 203 #200

Refer to Handout #17

See also Hydraulic Tools

SCREENED OR BARBED WINDOWS AND OTHER OPENINGS

If the mesh guard is hinged and secured with a padlock, cut the lock with bolt cutters or pry the hasp.

To free bars in masonry, a firefighter should strike the bar with a sledge about 10 inches above the sill.

As the bar bends in, the end will sometimes pull free of the sill.

Another method is to strike the sill with a sledge opposite the end of the bar.

A blow at this point will sometimes crack masonry sufficiently to release the end of the bar.

Still another method is to start a hammer head pick in the masonry sill at the edge of the bar.

Strike the head of the pick with a sledge to crack the masonry sufficiently to release the end of the bar.

Iron gratings may be found in sidewalks over basement windows, in floors, or in walls.

They may be merely held in position by the friction of the grating against the sill,

they may be pivoted at the rear,

or they may be set in masonry and locked in position with with hasp and padlock.

They can sometimes be opened using the pick of an axe by forcing it between the sill and the grating and then prying up.

A tow chain connected to a motor vehicle or a winch line may be used to remove iron bars and wire mesh guards from windows.

The oxyacetylene cutting torch and power saws are recommended forcible entry tools for steel construction and they will work when other tools fail.

Steel doors, gratings, bars and other steel obstructions may be cut with the torch.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 64 #101

Ref. p. 203 #200

Note: Sweet's Catalog on
windows available from
F.W. Dodge Company 330
W. 42nd Street, New York,
N.Y. 10036 is another
valuable source of inform-
ation.

Check with local glass
replacement company for
the availability of the
gang device.

COMBINATION STORM WINDOWS

The frames of storm windows are usually made of aluminum.

An attempt to force them will usually cause damage to the
point they will have to be replaced.

The construction features of storm windows are basically
the same for all types.

They consist of:

- . a framework which fastens over the outside of the prime
window unit,
- . an upper sash
- . and removable lower sash with screen.

The lower sash of storm windows will usually raise vertically
in addition to their ability to be removed.

These features are of little benefit to firefighters
since the lower sash must be operated from inside the
building.

SPECIAL CONSIDERATIONS

One of the best ways to learn to recognize the various kinds
of windows is through building inspection surveys by the
firefighters.

Obviously, if window glass in upper floors of buildings
must be broken, the firefighter must either be on that floor
or perform the operations from a ladder or elevated platform

Breaking glass outward in high-rise buildings creates
hazards.

The following method can be used to break glass window panes
and pull them inward to the floor.

Using a regular glass cutter, the firefighter scores the
window pane diagonally, two ways, from corner to corner.

The firefighter then locks on or attaches to the pane a
commercial suction cup device (preferably a three cup gang)

It is IMPERATIVE that the firefighter wear full protective
clothing with tough gloves and eye protection while
breaking any glass.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 67 #101
Ref. p. 204 #200

SPECIAL CONSIDERATIONS

If the proper technique is used, four triangular pieces of glass can be removed and pulled inward individually.

Should the window have a double pane and be sealed for thermal resistance, the procedure must be repeated.

CAUTION : When firefighters are using this technique in high-rise buildings they should be secured with a life line for their personal safety and protection.

OPENING WALLS AND CEILINGS

The firefighter may be occasionally be confronted with a forcible entry problem in a building which does not allow the use of the techniques previously described.

Such a building may be windowless and have heavy maximum security doors and locks

or

a particular fire situation may require an entry and attack where no convenient windows or doors are placed.

Then the firefighters must deal with the somewhat harder more time consuming tasks of opening walls, partitions or ceilings.

The EXTERIOR WALLS of a building may be one of the following types of construction:

1. Masonry
2. Metal
3. Masonry Veneered
4. Wood Frame

PARTITIONS are essentially interior walls and are generally constructed of 4-inch materials over which is applied a suitable finish.

BEARING PARTITIONS are those that support a portion of the building or roof structure and are usually constructed with the same thickness and materials as the exterior walls.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 68 #101
Ref. p. 205 #200

OPENING WALLS AND CEILINGS

OPENING TECHNIQUES FOR MASONRY WALLS

MASONRY EXTERIOR WALLS may be constructed of:

brick	concrete blocks
stone	glass blocks

They are more desirable and in common use because of their fire resistive qualities.

These walls are usually 8 to 12-inches thick, depending upon the particular material used and the size of the building.

MASONRY VENEERED WALLS are such that the supporting members are wood with one layer of brick or stone on the exterior to give the appearance of a solid brick or stone wall.

The upright wood supporting members are called "studs".

These studs are usually 2 by 4-inches spaced at 16- to 24-inches intervals.

The presence of these studs creates a hollow space in the wall through which fire can spread.

Fire stops, as previously discussed, should be provided in these hollow spaces.

The OPENING OF MASONRY WALLS is called "breaching".

There are several forcible entry tools that can be used for this purpose:

Battering Ram	Heavy-duty Circular Saw with masonry cutting blade
Heavy-duty Power drills	Air or electrical powered "jack" or impact hammers
Sledge Hammers	Wall Picks

Of all the tools indicated the power tools are the best and quickest and can be operated by individual firefighters.

The battering ram is made of iron with handles and hand guards.

One end is serrated, the other rounded and smooth.

INSTRUCTORS NOTES

TEACHING POINTS

REF: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 69 #101

Ref. p. 206 #200

When breaching a masonry wall with the battering ram use four firefighters rather than just two.

1. Strike the point where entry is desired with the serrated end of the tool, knocking out bricks and block or punching a hole through the wall.
2. Turn the tool end for end and using the smooth rounded end of the tool, enlarge the hole to the size desired.

Be sure a charged line is in place before breaching a wall.

If there is an exterior covering, such as, stucco over brick, remove it before attempting to breach the wall.

OPENING METAL WALLS

Metal and prefabricated metal walls are becoming more and more popular for exterior wall construction.

There are several reasons why its use has recently become extensive, but one which affects forcible entry is the opportunity to add insulation between the exterior and interior surfaces.

Construction of this type can be found in:

storage buildings
service stations
store fronts

and other commercial buildings.

The metal for these walls is usually in the form of
sheets - sections - panels

These metal sheets are fastened to wood or metal studs by bolts, screws, rivets or by welding.

The metal may have a painted or porcelain coated surface, and a damaged panel may be difficult to replace.

ENTRANCE THROUGH A DOOR OR WINDOW IS USUALLY PREFERRED TO OPENING A METAL WALL AND ITS BREACHING IS USUALLY CONSIDERED AS A "LAST RESORT."

If opening a metal wall cannot be avoided, a metal cutting power saw is normally the best way to open the wall.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 70 #101

Ref. p. 206 #200

OPENING METAL WALLS

The panels should be examined to determine if:

there are studs or other supports

or

if the walls support the entire structure.

It is extremely important to be sure that the material to
be cut will not:

weaken the structure

or

that electrical wiring or plumbing is not cut.

Be sure the opening is made neatly, this will aid in
the repair of the structure, and when possible, the
entire sheet or panel should be removed.

1. The metal should be cut along the studding to provide
stability for the saw and ease of repair.
2. After the metal is cut, it should be removed and placed
in a location where it will not endanger anyone.
3. Insulation or other material may be in the wall and it
can usually be cut with an axe for removal.
4. Examine the inside wall surface, if any, for best method
of removal. (Note) In some cases an axe or can opener type
of forcible entry tool can be used to cut this thinner
layer of metal.

CAUTION: Proper precautions should be taken when opening
metal walls covered with porcelain, because there may be
flying chips of porcelain.

OPENING WOODEN FRAME WALLS

Wooden frame walls are constructed with wood or fibreboard
sheathing nailed over the studs.

Over the sheathing is fastened the exterior siding, which may
be:

wood clapboards
asbestos cement shingles

board and batten siding
stucco

or other exterior finish.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 72 #101
Ref. p. 206 #200

Remodeling and beautifica-
tion programs have resulted
in new store fronts being
constructed over old exist-
ing walls.

The new materials may be of
metal or one of the many
masonry materials avail-
able.

These double walls present
a difficult problem when
entry is attempted.

During pre-fire planning
these structures should
be examined to assure app-
ropriate entry plans can
be made.

Refer to Handout #18

OPENING WOODEN FRAME WALLS

The framework between the studs is hollow or may be
filled with insulation material.

In either case these spaces should be blocked off
with fire stops.

The inside of the wood frame wall may be finished with:

gypsum board
wood

plaster over metal
gypsum lath

It is not necessary to completely open a wooden frame
wall.

CAUTION: IT IS EXTREMELY IMPORTANT TO WATCH FOR ELECTRICAL
WIRING AND PIPES.

The need for opening wood framed walls is to reach
and area involved in fire between the studs.

1. Remove the siding.
2. Sound the wall to locate the studs.
3. Cut the sheathing alongside the stud the desired size
of opening.

OPENING PARTITIONS

For the purpose of this unit, three general types of
partition construction;

hollow clay tile

covered wood or metal studding

Solid gypsum blocks

will be considered.

Solid masonry partitions should be opened in the same
manner as has been described for exterior masonry walls,
and the same precautions taken.

Unless previous inspections have been conducted on the
building involved, it is very difficult to determine
the construction of a partition during fire fighting
procedures.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 73 #101

Ref. p. 206 #200

OPENING PARTITIONS

If an opening needs to be made in a partition, the following procedures are suggested:

1. Select the location of the opening and, before attempting to open the partition, check for electric wall plugs and switches.
2. Have sufficient tools, such as power tools, wall picks, fire axes, sledges and pry bars available.
3. If the studding in the partition is wood or metal, locate the studs by sounding.
4. Cut along the studs with the appropriate tool.
5. If the partition is hollow clay tile or gypsum block, crush one or two blocks with a sledge or jackhammer, and the other blocks or tile will remove more easily.

NOTE: PARTITIONS SHOULD NOT BE OPENED UNLESS THERE IS AN INDICATION OF FIRE IN THE WALL.

Three ways for determining if there is a fire in a partition are:

1. feeling on wall for hot spots
2. looking for discolored wallpaper or blistered paint
3. listening for the sound of burning.

The partition should be opened on the side where opening will cause the least damage.

An opening in a partition should be made only in the area where the fire is indicated;

cutting the wall covering along the studs and carefully removed.

If possible, place a salvage cover on the floor before opening the partition.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA,
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA,
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 74 #101
Ref. p. 206 #200

Refer to Handout #19

OPENING CEILINGS

Ceilings consist of built-up materials applied to
the underneath side of the:

floor joist

concrete floor

ceiling joist

This built-up material may be:

lath and plaster

ceiling tile applied to furring strips

sheet metal

gypsum wall board

In some cases, ceiling tile may have been fastened over
old lath and plaster by an adhesive or the ceiling tile
may be applied over concrete in the same manner.

A DROP CEILING consists of metal strips which are hung
the desired height from the roof or from the floor
above and to which a ceiling material is fastened.

The methods of opening ceilings from below involve the use
of either a pike pole or a plaster hook, which because of
its spreading head is more adaptable for this purpose.

To open a plastered ceiling, the firefighter must first
break the plaster then pull off the lath. A pike pole is
often used for this operation.

Metal and composition ceilings may be pulled from the joists
in a like manner.

When pulling, a firefighter should not stand under the space
to be opened.

The pull should be down and away to prevent the ceiling
material from dropping on the head of the firefighter.

No firefighter should attempt to pull down a ceiling without
wearing FULL PROTECTIVE CLOTHING including FIRE HELMET AND
EYE PROTECTION, and should stand between the work area
and an opening through which an escape can be made if
necessary.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101 IFSTA
pp. 7-100

Ref. Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 75 #101
Ref. p. 207 #200

Refer to Handout #20

OPENING CEILINGS

The head of the pike pole may turn after it is forced through a plaster or other type wall.

It is sometimes difficult to determine the direction in which the pike on the head of the pole is pointing after it has been driven through a ceiling.

This difficulty can be eliminated by filing small notches on the pike side of the handle, a firefighter can then keep the head lined up with the original hole.

The plaster hook penetrates plaster and lath ceiling and wall coverings easily, and it is useful in removing metal ceilings, plaster or other obstructions to get to the fire.

It is made of tool steel with a spear head and two blades which have sharp edges.

The blades fold downward when the spear is forced thru an object, but they automatically open again after penetration.

This feature causes ceiling and wall material to be pulled away when a pull force is applied to the handle.

SPECIAL FORCIBLE ENTRY OPERATIONS

Forcible entry operations include more than opening doors, windows, floors, walls, and property barriers, for their are basements and sub-basements, Vault-type doors, and government lock-outs which require special operations.

Basements and sub-basements often have outside entrances. These openings may have stairways, elevators or chutes leading to the ground level.

At the ground level there may be iron gratings, iron shutter or wooden doors which secure the entranceway. Vault-type doors may be found and on fur and bank vaults.

INSPECTIONS AND PRE-PLANS OF OPERATIONS SHOULD BE PREPARED FOR SUCH LOCATIONS.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200 IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 76 #101

Ref. p. 207 #200

CAUTIONS AND PROCEDURES

When making a service call for a lock-out, be sure to get proof of ownership before assisting the person or making a forcible entry.

As an added precaution, have a law enforcement officer present before taking any action at this type of call.

Some of the many safety cautions and procedures that apply to all forcible entry operations are listed as follows:

- . Always try a door or window before you pry.
- . Carry tools with the safety of yourself and others in mind.
- . Watch for explosive atmospheres.
- . When it is possible, block a door or window open after entrance to make a safe exitway.
- . Do not place tools where they will create a tripping hazard.
- . Stand to the side when breaking glass and remove all jagged pieces.
- . Block all overhead doors open (up position) after entrance.
- . Watch for overhead obstructions and bystanders when swinging an axe and keep area clear whenever possible.
- . When opening walls and ceilings, watch for electrical wiring and pipes.
- . One large opening is usually better than several small openings.

CAUTION: A CHARGED HOSE LINE SHOULD ALWAYS BE AVAILABLE WHEN USING FORCIBLE ENTRY.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

Ref: Essentials of Fire
Fighting, #200, IFSTA
pp. 185-207

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 77 #101

Refer to Handout #21

TEACHING POINTS

OPENING ROOFS

Many designs and shapes of roof styles are used, and their names vary in each locality.

Roof coverings may be of:

- a. wood shingles
- b. composition shingles
- c. composition roofing paper
- d. tile
- e. slate
- f. built-up tar and gravel

The selection of a proper roof covering is important from a fire protection standpoint because it may be subjected to sparks and blazing brands if a nearby building should burn.

A study of the more common types of roofs and the manner in which their construction affects opening procedures is necessary to develop effective vertical ventilation.

Some of the more common styles are the:

Flat
Gable
Shed
Butterfly
Hip
Mansard
Lantern arched
Gambrel
Dome

FLAT ROOFS

Flat roofs are more common to:

Mercantile Buildings
Industrial Buildings
Multiple Dwelling Apartments

than to individual dwellings.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 78 #101

Refer to Handouts #22-23

For additional specific
information on ventilation
techniques, see also IFSTA
#107 , Fire Ventilation
Practices.

TEACHING POINTS

FLAT ROOFS

This type of roof ordinarily has a slight slope toward the rear of the building and is frequently pierced by chimneys, vents, pipes, shafts, scuttles and skylights.

The structural part of the flat roof is generally similar to the construction of a floor which consists of wooden, concrete or metal joists covered with sheathing.

The sheathing is covered with a layer of waterproofing material and an insulating material.

Instead of joists and sheathing construction, flat roofs are sometimes poured reinforced concrete or precast gypsum or concrete slabs set within metal joists.

The best way for firefighters to determine the material from which roofs are constructed is through the inspection and pre-fire planning surveys of the department.

When cutting through a roof the firefighter should make the opening rectangular or square to facilitate later repairs.

One large opening (at least 4-feet by 4-feet) is much better than several small ones.

On the rare occasion when a roof opening is the only method of entering a fire area or the quickest method because of the security-type doors and walls, the firefighters must adjust their approach from the more common roof opening techniques used for ventilation purposes.

A ventilation opening will be located over the fire; an entry opening will not, obviously.

A procedure for opening a wood joist or rafter roof with an axe is suggested in the following sequences:

Step 1. Use the following factors to determine the location for the opening to be made.

Location of intense fires	Existing exposures
Highest point on roof	Extent of fire
Direction of wind	Obstructions

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 80

Refer to Handout #24

FLAT ROOFS

- Step 2. Locate roof supports by sounding with the axe. Between the rafters or joists it will sound hollow and the axe will bounce. When near or on top of a support it will sound dull and solid.
- Step 3. Mark off the location for the opening by scratching a line on the roof surface with the pick head.
- Step 4. Remove the built-up roof material or metal by cutting the material and using the pick head to pull the material out of the way.
- Step 5. Cut the wood decking diagonally alongside the joist toward the hole. (NOTE: The joist should never be cut.) Cutting alongside a joist permits the blows to have a solid base to avoid bouncing.
- Step 6. Use short strokes when chopping. If an axe must be swung high to apply more force, check for overhead obstructions and other firefighters. If the blade becomes wedged, care should be taken to avoid breaking the axe handle.
- Step 7. After ALL cuts have been made, pry up the roof boards with the pick end of the axe. After an opening has been cut in the roof, push the blunt end of a pike pole, plaster hook, or some other suitable tool through the roof opening to open the ceiling(s) below.

The procedure for opening a flat and pitched wood joist roof is similar.

Power equipment for opening roofs is most useful and often provides a means by which ventilation procedures can be accelerated.

This equipment may be driven by an electrical motor or by gasoline engines attached to the saws.

Circular power saws can be equipped with a carbide blade .

The chain and reciprocating power saws are also useful.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 81

Refer to Handout #25

PITCHED ROOFS

The pitched roof is one that is elevated in the center and thus forms a pitch to the edges.

Pitched roof construction involves timber rafters or metal trusses that run from the ridge to a wall plate on top of the outer wall at the eaves level.

The rafters or trusses which carry the sloping roof can be of various materials.

Over these rafters, the sheathing boards are applied either squarely or diagonally across the rafters.

These sheathing boards are usually applied solidly over the entire roof.

Pitched roofs sometimes have a covering of roofing paper applied before shingles are laid. Shingles may be wood, metal, composition, asbestos, slate or tile.

Pitched roofs on barns, churches, super markets and industrial buildings may have roll felt applied over the sheathing and then mopped with asphalt roofing tar.

Gypsum slabs, approximately two inches thick, may be laid between the metal trusses of a pitched roof instead of wood sheathing.

THESE CONDITIONS SHOULD BE DETERMINED THROUGH PRE-FIRE PLANNING OR INSPECTION SURVEYS BY FIRE DEPARTMENT PERSONNEL PRIOR TO AN ACTUAL FIRE.

Pitched roofs include any which have a more pronounced downward incline than those of flat roofs. This incline may be gradual or steep.

The procedures for opening pitched roofs are quite similar to those for flat roofs EXCEPT that additional precautions to prevent slipping must be taken.

USE A ROOF LADDER WHEN OPENING PITCHED ROOFS.

OPENING PITCHED WOOD JOIST ROOFS

Step 1. Place a roof ladder on the roof and locate the position where the opening is to be made. Bounce the axe on the roof to sound for solid supports or rafters.

Step 2. Move the roof ladder to either side of the selected location and use the ladder for support. The location should usually be as near as possible to the highest point of the roof.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA,
pp. 7-100

4-2 Forcible Entry

4-2.1
4-2.2

Ref. pp. 82-83

OPENING PITCHED WOOD JOIST ROOFS

Step 3. Rip off the shingles or roofing felt sufficiently to permit the initial cut to be made.

(In some cases, it is best to first remove all shingles or roofing felt from the entire area where the hole is to be made.)

Step 4. Cut the sheathing along the side of a rafter the distance required for the opening. The opposite side of the opening may then be cut in a like manner.

(the opening should be square or rectangular.)

Step 5. Remove sheathing boards with the pick of the axe or some other suitable tool.

Step 6. Push the blunt end of a pike pole or other long handled tool through the hole to open the ceiling(s).

Power tools open a roof quickly and are much preferred over an axe in performing this task.

Although the circular saw requires more skill and care than an axe, especially when used on a roof, the resulting hole is not only completed faster but is also much neater.

This consideration takes on more importance when repairs must be made by the owner.

ARCHED ROOFS

Arched roof construction has demonstrated many desirable qualities for certain types of buildings.

One form of arched roof construction uses the bow-string truss for supporting members.

The lower chord of the truss may be covered with a ceiling to form an enclosed cockloft or roof space.

Such concealed, unvented spaces are definitely forcible entry problems and contribute to the spread of fire.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-3 Forcible Entry

4-2.1
4-2.2

Ref. pp. 84-85

Refer to Handout #26

ARCHED ROOFS

A trussless arched roof has been developed that is made up of relatively short timbers of uniform length.

These timbers are beveled and bored at the ends where they are bolted together at an angle to form a network of structural timbers.

This network forms an arch of mutually braced and stiffened timbers.

Being an arch rather than a truss, the roof exerts a horizontal reaction in addition to the vertical reaction.

The result of these reactions is the roof thrust, which is distributed to truss supports.

Trussless arch construction enables all parts of the roof to be visible to firefighters.

A hole of considerable size may be cut or burned through the network sheathing and roofing at any place without causing collapse of the roof structure, since the loads are then distributed to less damaged timbers around the opening.

Cutting procedures for opening arched roofs are the same as for flat or pitched roofs except that it is doubtful that a roof ladder can always be used on an arched roof.

Long straight or extension ground ladders and aerial ladders may sometimes prove satisfactory by placing the ladder as flat on the roof as possible.

Regardless of the method used to support the firefighter, the procedure is difficult and dangerous because of the curvature of the roof.

PROPER SAFETY PRECAUTIONS SHOULD BE OBSERVED.

PRECAST AND CONCRETE ROOFS

The use of precast concrete is very popular with certain types of construction.

Precast roof slabs are available in many shapes, sizes, and designs.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 86

TEACHING POINTS

PRECAST AND CONCRETE ROOFS

These precast slabs are hauled to the construction site, ready for use.

Other builders form and pour the concrete on the job.

Roofs of either precast or reinforced concrete are extremely difficult to break through and this method of opening should be avoided whenever possible.

A popular lightweight material made of gypsum plaster and portland cement and mixed with aggregates of perlite, vermiculite or sand provides a lightweight floor and roof assembly. This material is sometimes referred to as lightweight concrete.

Lightweight precast planks are manufactured from this material and the slabs are reinforced with steel mesh or rods.

Lightweight concrete roofs are usually finished with roofing felt and a mopping of hot tar to make them watertight.

Lightweight concrete roof decks are also poured in place over permanent form boards, steel roof decking, paper-backed mesh or metal rib lath.

Some types of lightweight concrete can be penetrated with a hammer headed pick, a power saw, a jackhammer, or any other penetrating tool.

Prestressed concrete is made of a higher strength concrete than precast or reinforced.

Prestressed concrete makes a very efficient structural member because it combines the most desirable characteristics of concrete and steel.

However, there is a somewhat greater tendency for prestressed to spall, thus exposing the prestressing steel.

It does not provide a likely material for forcible entry.

METAL ROOFS

Metal roof coverings are made from several different kinds of metal and they are constructed in many styles.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1

4-2.2

Ref. pp. 86-87

Refer to Handout #27

METAL ROOFS

Light gauge steel roof decks can either be supported on steel framework or they can span across wider spaces.

Other types of corrugated roofing sheets are made from light gauge cold-formed steel, galvanized sheet metal, and aluminum.

The light gauge cold-formed steel sheets are used primarily for the roofs of industrial buildings.

Corrugated galvanized sheet metal and aluminum are seldom covered with a roof material and the sheets can usually be pried from their supports.

Metal cutting tools or power saws with metal cutting blades must be employed to open metal roofs.

Metal roofs on industrial buildings are usually provided with adequate roof openings, skylights or hatches.

THESE CONDITIONS SHOULD BE DETERMINED THROUGH PRE-FIRE PLANNING OR INSPECTION SURVEYS BY FIRE DEPARTMENT PERSONNEL PRIOR TO AN ACTUAL FIRE.

ROOF OPENING COVERS

Natural roof openings may exist on various types of roofs in the form of:

- a. scuttle hatches
- b. skylights
- c. monitors
- d. ventilating shafts
- e. stairway doors

Most types will ordinarily be locked or secured in some manner against entry.

Scuttle hatches are normally square and large enough to permit a person to climb to the roof from the cockloft.

They may be metal or wood and, generally speaking, they do not provide an adequate opening for ventilation purposes.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 87

Ref. p. 89

ROOF OPENING COVERS

If skylights contain ordinary shatter type glass, they may be conveniently opened.

If they contain wired glass, as illustrated in Handout #27, they are very difficult to shatter and are more easily opened by removing the frame.

The sides of a monitor may contain glass (which is easily removed) louvers of wood or metal.

The sides which are hinged are easily forced at the top.

If the top of the monitor is not removable, at least two sides should be opened to create the required draft.

Stairway doors may be forced open in the same manner as other doors of like type.

OPENING FLOORS

There are almost as many kinds of floors as there are buildings.

The type of floor construction is, however limited to the two basics:

- a. wood
- b. concrete

Either of the two may be finished with a variety of floor covering materials.

With the advent of vast housing developments, a departure from the conventional subfloor and wood joist construction over foundation and grade beam footings is presently common practice for single and multiple family dwellings.

Rather, concrete slab floors over tested and rustproof plumbing is quite common.

Generally speaking, the floors of upper stories of family dwellings are still wood joist with subfloor and finish construction.

It is not uncommon for a floor to be classified according to its covering instead of the material from which it is constructed.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1
4-2.2

Ref. p. 90

Refer to Handout #28

TEACHING POINTS

OPENING FLOORS

The feasibility of opening a floor during a fire fighting operation, obviously depends on how and from what material it is constructed.

A wood floor does not in itself insure that it can be penetrated easily.

Many wood floors are laid over a concrete slab.

The type of floor construction can be determined by pre-fire inspection surveys of business and industrial structures, but similar information for residential structures is not easily obtained.

WOOD FLOORS

The wooden joists of wood floor construction are usually spaced a maximum of 16 inches apart.

A subfloor, consisting of either 1-inch boards or 4-foot by 8-foot plywood, is first laid over the joists.

The finish flooring, which may be linoleum, tile, hardwood flooring, or carpeting, is laid last.

The subfloor is ordinarily laid diagonally to the joists and the finished floor at right angles to the joists.

Wood floors may be opened with a fire axe in much the same way as a flat roof. There are however, two separate cutting jobs required because the finished floor and the subfloor usually run in different directions.

A procedure for opening wood floors with an axe is suggested in the following sequences:

Step 1. Determine the location for the hole, sound for floor joists, and cut one side of the finished floor by using angle cuts.

Step 2. Cut the other side of the finished floor in a like manner and remove the flooring or floor covering with the pick end of the axe.

Step 3. Cut the subfloor using the same technique and angle cuts.

INSTRUCTORS NOTES

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1

4-2.2

Ref. pp. 91-92

Refer to Handout #29

TEACHING POINTS

WOOD FLOORS

It is usually advisable to cut all sides of the subfloor before removing the boards.

If just a few boards are removed before the others are cut, the heat and smoke conditions may prohibit completion of the job.

A gasoline powered circular saw can quickly and neatly cut both layers of a wood joist floor.

Completely separate the cut-out flooring with another tool.

Before using either tool to open floors, remove the floor covering and roll up or remove carpets and rugs.

If the unit is not self powered, it is best to supply power from a portable generator carried on the apparatus rather than depend on domestic power during a fire.

CONCRETE FLOORS

The general construction of reinforced concrete floors makes them extremely difficult to force, and opening them should be bypassed if possible.

If concrete floors must be opened, the most feasible means is to use a compressed-air jackhammer.

Unless a jackhammer is readily available, this process is extremely slow and may not prove beneficial for fire extinguishment, but it might be the best means for rescue operations.

Concrete cutting blades are available for most portable power saws.

There are also special purpose nozzles which are designed to penetrate masonry.

Although these devices are primarily nozzles, they also qualify as forcible entry tools. They are sometimes called puncture or penetrating nozzles, because of their ability to be driven into hard objects.

The point of the tool is hardened steel and the head can be hammered with a mallet or sledge hammer.

INSTRUCTORS NOTES

TEACHING POINTS

Ref: Forcible Entry, Rope
& Portable Extinguisher
Practices, #101, IFSTA
pp. 7-100

4-2 Forcible Entry

4-2.1

4-2.2

Ref. p. 93

Refer to Handout #29

While it is not required
in the certification stan-
dards it is suggested
that the instructor may
wish to discuss the Feder-
al Building Entry Consider-
ations contained in pages
95-100 of the manual with
the class.

CONCRETE FLOORS

The barrel of the tool is hollow and small holes bored
through the barrel permits water to be expelled back to
the pint.

Provision is also made for a 1-1/2-inch hose line to be
attached to the nozzle which supplies the water under
pressure.

It is best to first strike the masonry or concrete with
a sledge hammer to shatter the concrete topping and
provide a center for the tool.

When wood or other materials are used as a finish over con-
crete, it often gives the appearance of a floor other
than concrete.

UNIT QUIZ

1. List the three situations where forcible entry is needed:

- a. _____

- b. _____

- c. _____

2. Describe the role fire stops play in building construction.

- _____
- _____
- _____

3. Name three fire service functions with which forcible entry may be associated:

- a. _____
- b. _____
- c. _____

4. List three kinds of door construction:

- a. _____
- b. _____
- c. _____

5. Identify four types of glass or glazing materials:

- a. _____
- b. _____
- c. _____
- d. _____

6. List for styles of roofs:

- a. _____
- b. _____
- c. _____
- d. _____

7. When cutting wood floors or roofs, the fire fighter should first _____
the covering materials.

8. List three ways of determining the presence of a fire in a partition:

- a. _____
- b. _____
- c. _____

9. What is the MOST IMPORTANT rule in forcible entry ?

10. List six precautions or procedures to be followed during forcible entry:

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

ANSWER KEY

1. Opening is locked
Opening is blocked
No opening exists

2. Fire stops cut off the draft and act as barriers to impede the spread of fire through walls and floors that would occur if they were not present.

3. a. Rescue
b. Ventilation
c. Access to victims or fire area
d. locked or blocked egress
e. Fire Attack
f. Overhaul
g. Salvage

4. a. Swinging
b. Revolving
c. Overhead
d. Sliding

5. Ordinary plate glass
Tempered glass
Wired glass
Plexiglass
Lexan

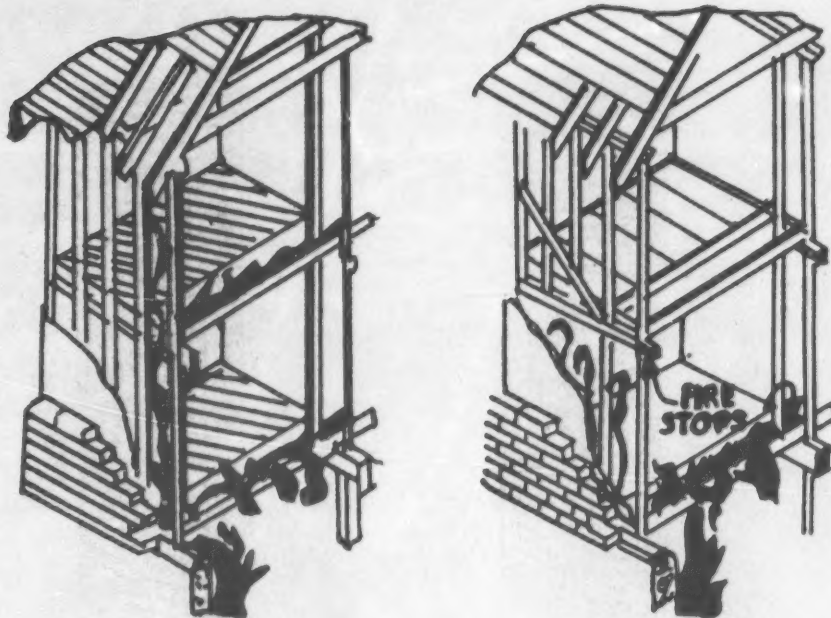
6. Flat
Gable (pitched, peaked)
Shed
Butterfly
Hip
Mansard
Lantern
Gambrel
Dome
Arched

7. Remove

8. a. Feel for hot spots
b. Look for discolored wall paper or blistered paint
c. Listen for burning sounds.

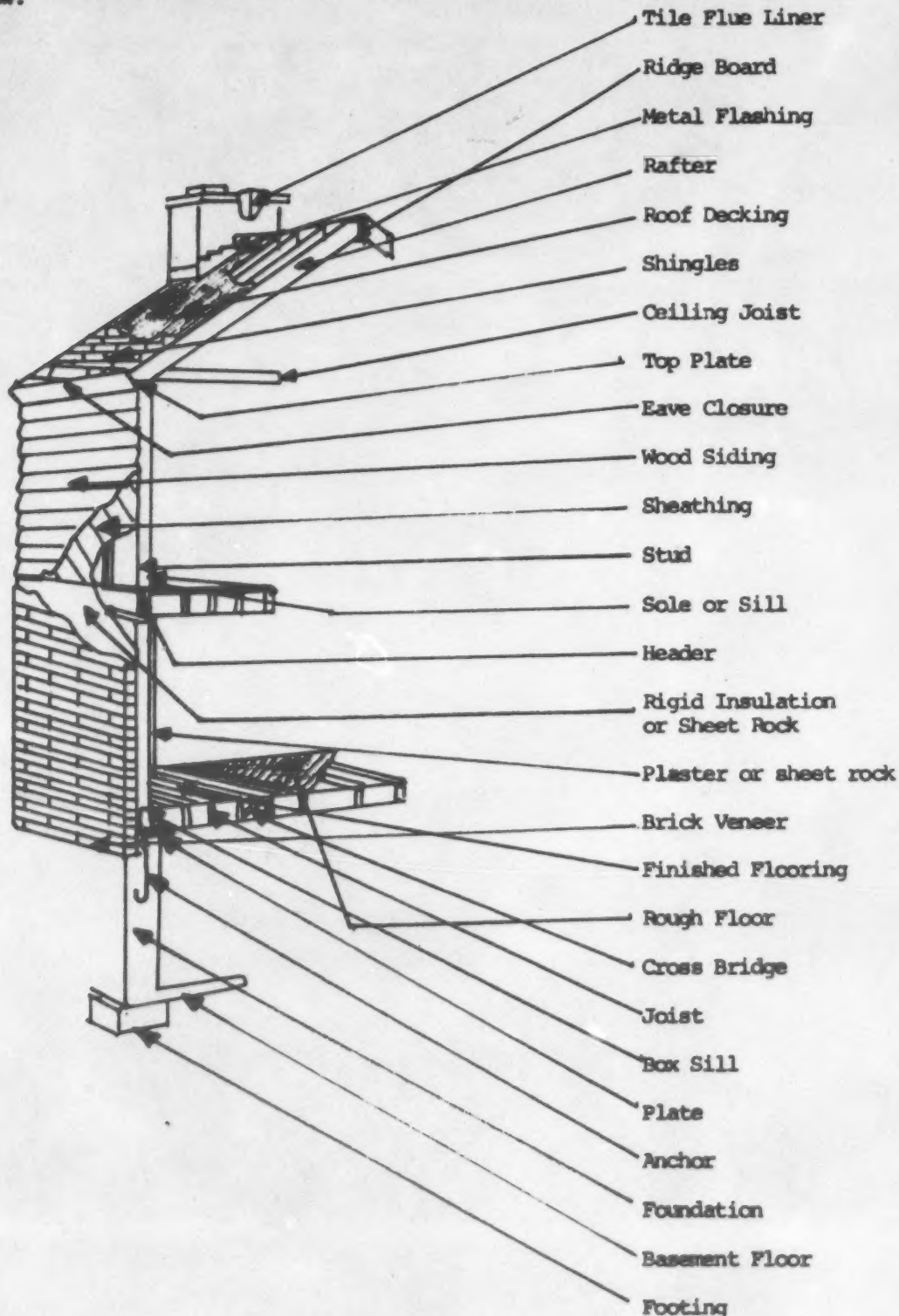
9. TRY BEFORE YOU PRY

10. a. Carry tools safely
b. Watch for explosive atmosphere
c. Try before you pry
d. Block open doors and windows after opening
e. Don't place tools where they will be tripped over
f. Stand to the side when breaking glass
g. Block overhead doors open
h. Watch for overhead obstructions and bystander
i. Watch for plumbing and wiring
j. A charged hose line should always be available when using forcible entry
k. One large opening is usually better than several small openings



FIRE STOPS of short pieces of 2 x 4's cut off the draft within walls to reduce the spread of fire and smoke. Without them, even a small controlled fire might be extending unseen.. The absence of fire stops can make some forcible entry decisions difficult.

Some terms which are used in the building trade and are very useful in this unit are illustrated below.



AXES AND HATCHETS

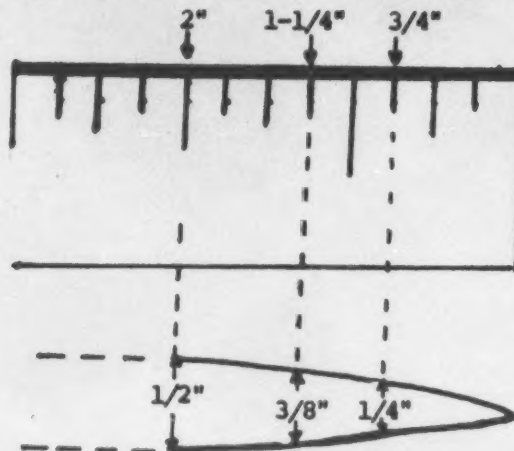
MAINTENANCE

If the blade is extremely sharp and the body of the blade is ground too thin, pieces of the blade may be broken out when cutting gravel roofs or striking nails or other materials in flooring.

If the body is too thick regardless of the sharpness of the blade, it is difficult to drive the axe through ordinary objects.

Medium thickness of the body of the axe is necessary.

The body thickness should be about 1/4 inch at 3/4 inches from the edge, 3/8 inch at 1-1/4 inches, and 1/2 inch at 2 inches from the edge.



The measurements are to be taken at the center of the blade as shown above.

The temper should be such that the blade will not bend easily or break off when nails, gravel or other foreign matter is struck.

Care must be used when grinding to prevent heating and the consequent softening of the steel.

The axe should be ground to preserve the body thickness and not merely to sharpen the blade.

After sharpening the blade, it should be ribbed lightly over a stone to take off an extremely keen edge and to lessen the possibility of cutting firefighters who may rub against the blade at fires.

The effectiveness of an axe depends more upon its proper usage than on the keenness of the blade.

Rust spots on the metal parts of such tools should be removed with emery paper and the spot covered with a light film of oil.

AXES AND HATCHETS

MAINTENANCE

The shoulder of the handle should be rather thick to prevent breaking should the axe be driven through a floor unexpectedly.

The handle grip should be thin to provide elasticity and it should be smooth to prevent splinters.

Wooden handles of axes and other similar tools should be sanded to minimize hand injuries.

After use, they should be cleaned with soapy water, rinsed and dried.

To prevent roughness and warping, a coat of boiled linseed oil is recommended for wood handles.

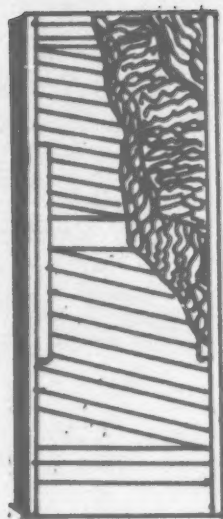
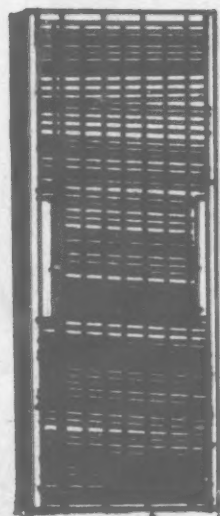
Paint or varnish on handles tends to blister when exposed to extreme heat.

Axes and hatchets or other tools equipped with fiberglass handles require a minimum of care.

Under normal usage they will not crack or splinter.

After use, they should be dried with a clean soft cloth.

WOOD SWINGING DOOR CONSTRUCTION



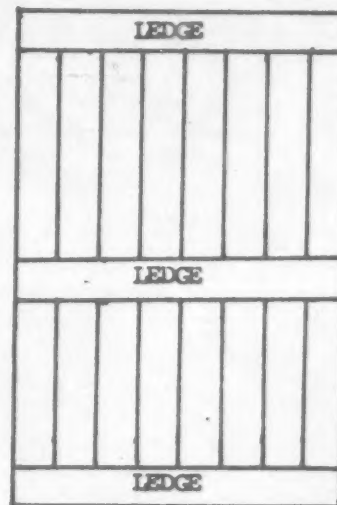
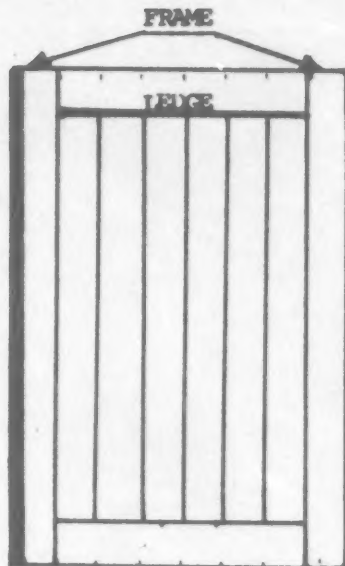
HOLLOW CORE



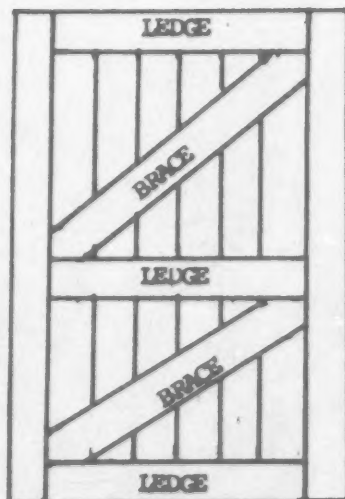
SOLID CORE

Both types can probably be pried at the jamb faster than going through the door with an axe.

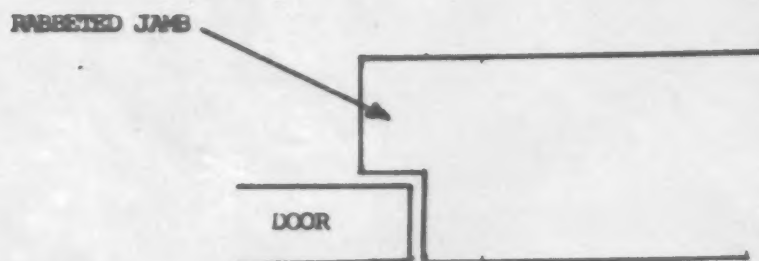
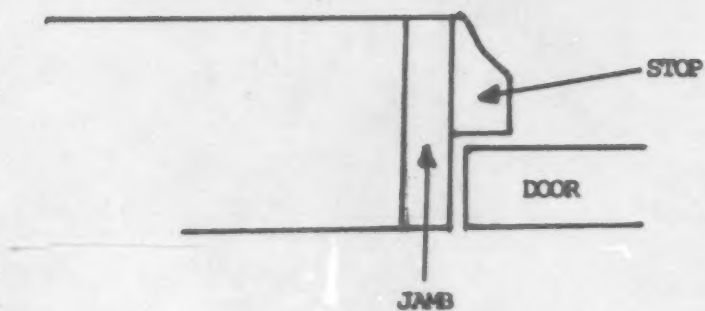
LEDGE DOOR CONSTRUCTION



These doors are solid and are better pried at the jamb than cut through.

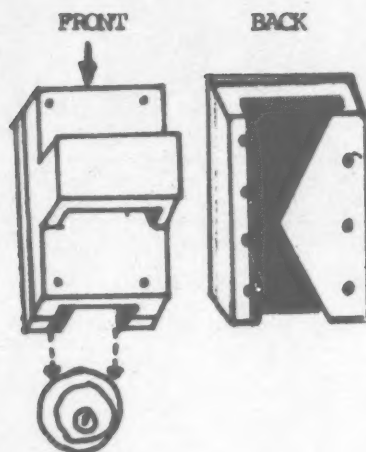


STOPPED AND RABBETED DOOR JAMBS



BREAKING OR PULLING THE LOCK

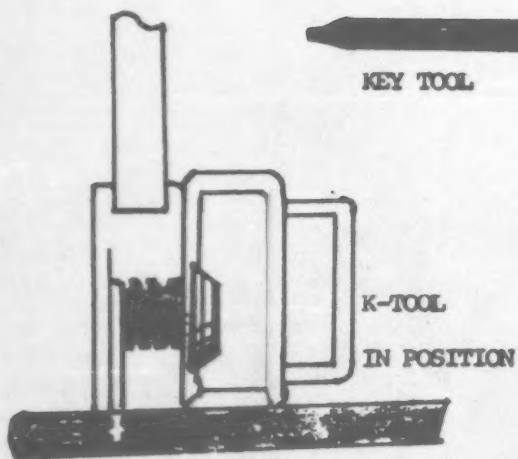
K-TOOL



One way to break a lock is to physically pull the cylinder out of the door.

The new K-TOOL is especially useful in pulling all types of lock cylinders, whether

RIM
MORTISE
TUBULAR



Used with a Halligan or other prying tool, the K-TOOL is forced behind the ring and face of the cylinder until the wedging blades take a bite into the cylinder.

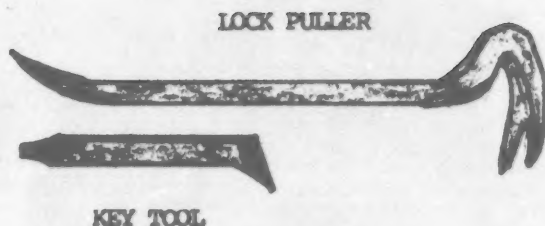
Light blows of a hammer help this forcing.

The K-TOOL is positioned correctly when the blades are engaged in the body of the cylinder, thus eliminating the likelihood of breaking off the ring and face of a cylinder made of white metal.

When the cylinder is removed, use a key tool in the hole to move the locking bolt to the open position.

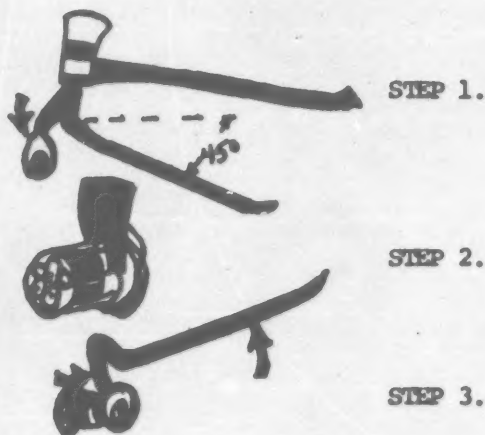
BREAKING OR PULLING THE LOCK

LOCK PULLER



To pull the lock;

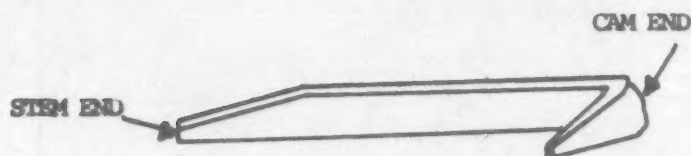
1. Hook the end of the lock puller directly above the ring of the lock escutcheon at an angle of about 45 degrees.
2. Using the flat head axe or other suitable tool, drive the tool behind the ring and cylinder face.
3. Lift up the straight end of the lock puller to pry the cylinder from the door.



Insert either the straight or bent end of the key tool into the hub of the lock and turn.

If for any reason this fails, insert the straight end of the lock puller through the hole and drive the lock off the door with an axe.

KEY TOOLS



A regular key tool has a tapered stem end and an angled cam end

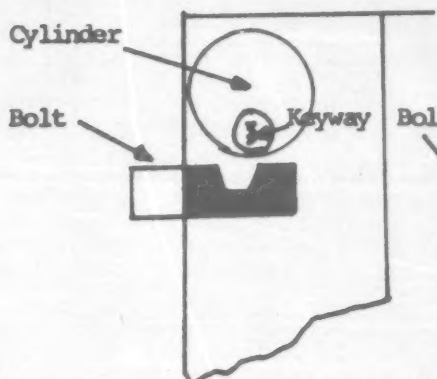
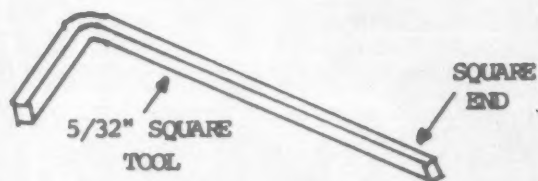


Fig. 1

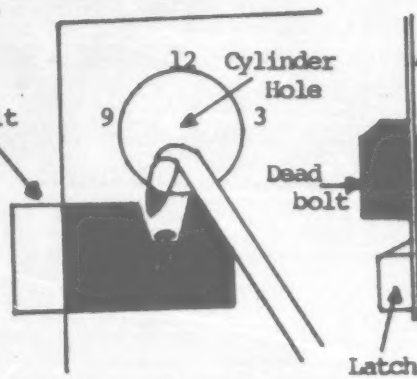


Fig. 2

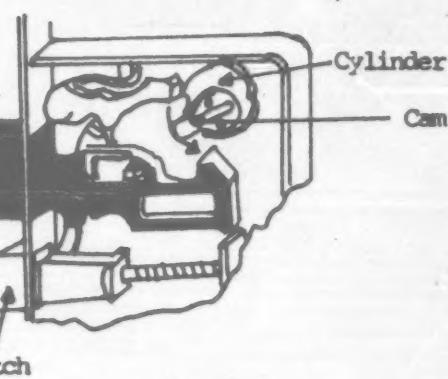


Fig. 3

Fig. A

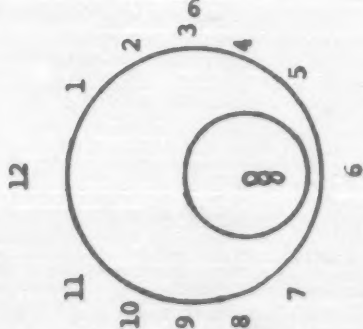
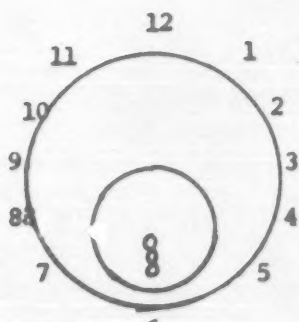


Fig. B

Tripping A Mortise Lock

When a mortise cylinder has been pulled and the cam end of a regular key tool is chosen, the next step is to establish a "6 o'clock" position to orient the later steps.

The 6 o'clock position will not always be straight up and down as on a clock, but can be to the side if the locking bolt is in that direction. Tempered glass doors may feature this condition.

Figures A & B show where the relative 6 o'clock position would be.

Using it as a reference, insert the correct end of the key tool parallel to the 6 o'clock position and perpendicular to the door with the cam end pointing to either 5 o'clock or 7 o'clock.

Try to depress the deadlock mechanism at one position, if it doesn't work try the other.

If found at 5 depress it and slide to 7 o'clock. If found at 7, depress and slide to 5 o'clock.

RIM LOCKS

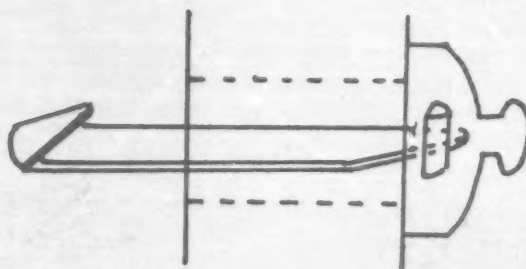
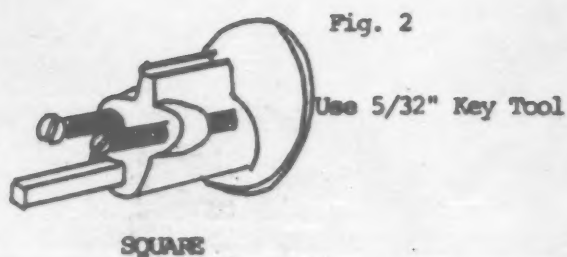
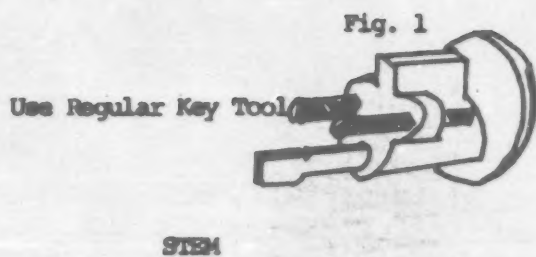


Fig. 3

Tripping The Rim Lock

When a rim lock cylinder has been pulled, use the flat tapered stem end of the regular key tool to replace the cylinder stem.

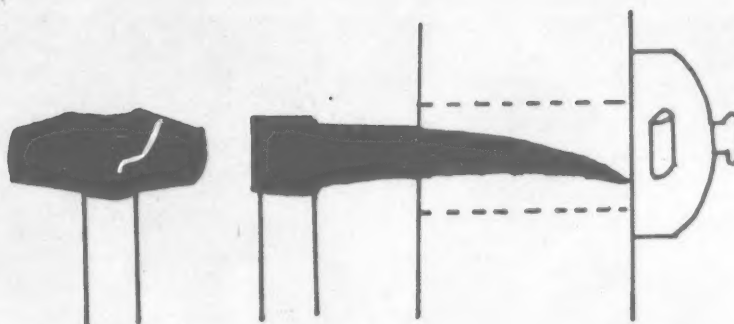
Insert the key tool while holding it parallel to the ground and perpendicular to the door.

Push it in until it reaches the back of the lock and turn the tool to retract the lock. (Fig. 3)

Some locks will open when turned clockwise, others must be turned counterclockwise.

Remember that the square stem on a police lock requires a 5/32" key tool.

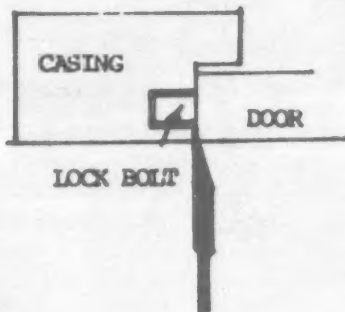
Fig. 4



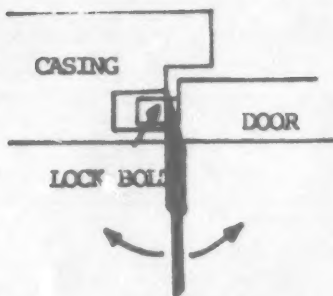
If for any reason the key tool will not fit into the backplate of the lock or it will not turn to disengage the lock, place the point of a Halligan tool or other long headed tool in the cylinder hole.

Then use a short handled sledge hammer to drive the lock off the backside of the door.

FORCING DOORS THAT OPEN TOWARD THE
FIREFIGHTER

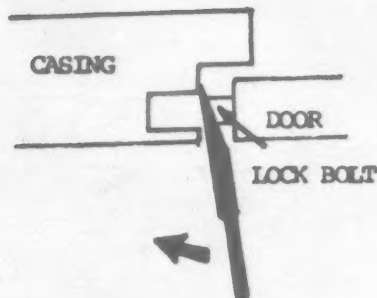


Step 1. Insert the blade of the prying tool between the door and the jamb near the lock.

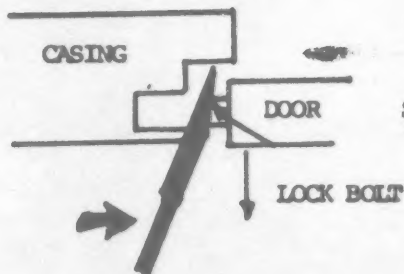


Step. 2 Force the blade in and against the rabbet or stop by working and pushing on the tool. Hammer the prying tool if necessary to push it as far as the stop. Work it back and forth.

Stopped or Rabbeted Jamb



Step 3. Pry the door and lock bolt clear of the jamb.



Step. 4 As the lock bolt clears, pull on the door to open it. If necessary insert another tool in the opening and continue to pry.

FORCING DOORS THAT OPEN AWAY FROM THE FIREFIGHTER
STOPPED JAMB



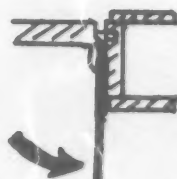
Step 1. Bump the cutting edge of the tool against the stop to break the paint or varnish so that the blade can be inserted.



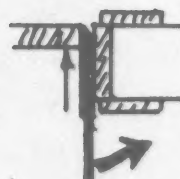
Step 2. Further loosen the stop at the lock location or remove the stop completely.



Step 3. Force the blade between the door and the jamb.



Step 4. Make the initial pry after the blade is past the stop and pressing on the door edge near the lock.

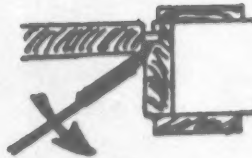


Step 5. With a full bite behind the door, pry the door away from the jamb until the bolt passes the keeper.

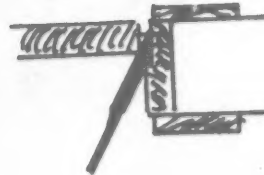
FORCING DOORS THAT OPEN AWAY FROM THE FIREFIGHTER
RABBETED JAMB



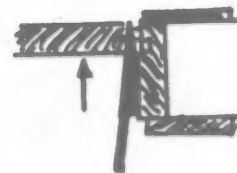
Step 1. Lay the blade of the tool flat against the door and insert the blade between the rabbet and the door.



Step 2. With short pries of one tool, work the blade of the second tool between the door and the jamb.



Step 3. Work or hammer the blade well into the opening.



Step 4. With a full bite behind the door, pry the jamb away from the door until the bolt passes the keeper.

LEXAN FORCING TECHNIQUES

A current trend in the construction industry is the use of plexiglass and other thermoplastics in place of glass windows.

"LEXAN" is an example of one such polycarbonate which has seen wide application as a glass substitute for its ability to withstand abuse from vandalism and weather.

LEXAN is:

250 times stronger than safety glass

30 times stronger than acrylics

50 percent lighter than glass

43 percent lighter than aluminum

and

is classed as self-extinguishing.

Lexan is available in thicknesses ranging from 1/8-inch to 1-inch, with the most common thicknesses being 1/8-inch to 1/2-inch.

Various tests have been conducted by departments across the country to gain information on the best way of forcing entry into openings containing Lexan.

The tests have utilized standard forcible entry equipment:

Pick head axes

Oxyacetylene Cutting Torches

Reciprocating Type Saws

Circular saws

These tests along with actual field experiences with Lexan during fire situations indicate that a circular saw with a carbide tipped blade is most effective when entry must be made through Lexan.

CAUTION: must be taken in blade selection;

- . A too fine of tooth blade will melt the lexan and cause the blade to bind.
- . A blade which is too coarse will cause the blade to slide dangerously over the cutting surface.

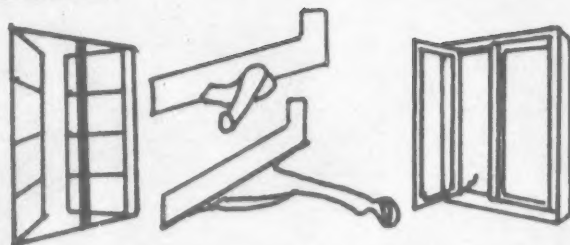
A MEDIUM TOOTH BLADE (APPROXIMATELY 40 TEETH) HAS BEEN FOUND TO YIELD THE BEST RESULTS.

It must be reported that during actual fire conditions, even where companies had been made aware of the Lexan characteristics, much difficulty was encountered in ventilating buildings with Lexan windows.

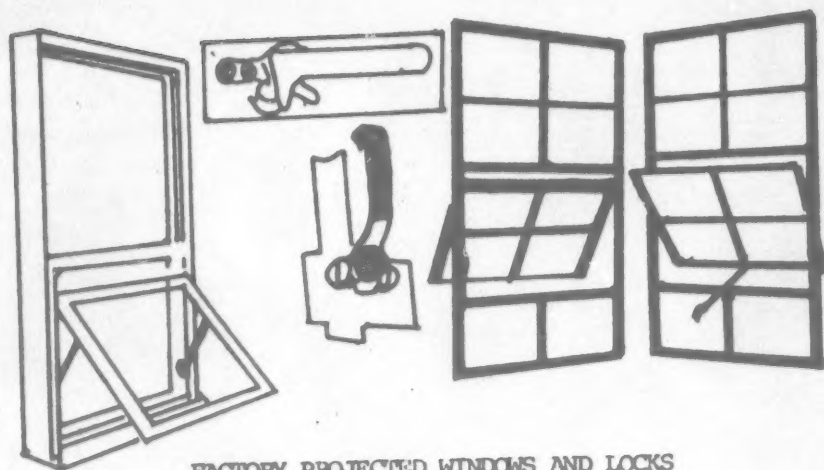
WINDOW TYPES



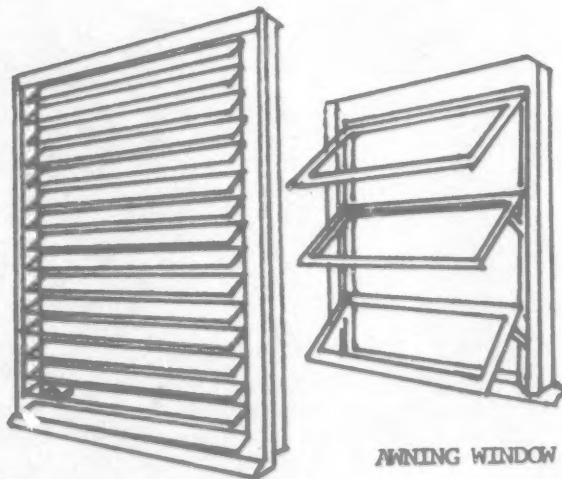
CHECKRAIL OR
DOUBLE HUNG



CASEMENT WITH LOCKING MECHANISMS



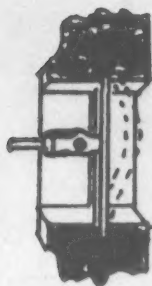
FACTORY PROJECTED WINDOWS AND LOCKS



AWNING WINDOW

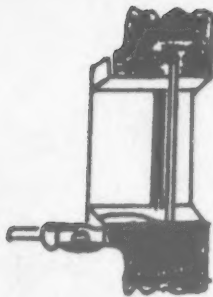
JALOUSIE WINDOW

FORCING BARS IN MASONRY



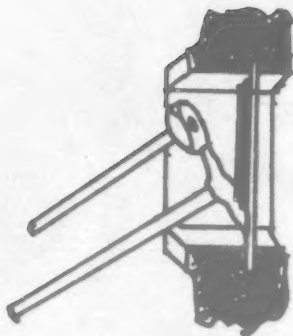
Method 1. Strike the bar with a sledge about 10 inches above the sill.

As the bar bends in, the end will sometimes pull free of the sill.



Method 2. Strike the sill with a sledge Opposite the end of the bar.

A blow at this point will sometimes crack masonry sufficiently to release the end of the bar.



Method 3. Start a hammer head pick in the masonry sill at the edge of the bar.

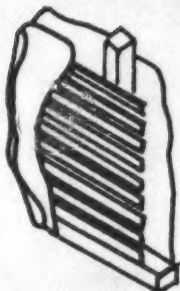
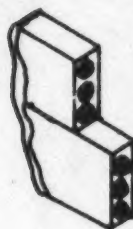
Strike the head of the pick with a sledge to crack the masonry sufficiently to release the end of the bar.

Method 4. Consider the capabilities of Hydraulic tools available at the scene.

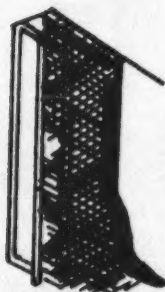
TYPES OF PARTITIONS



HOLLOW
CLAY
TILE



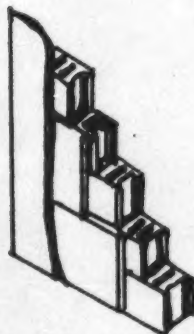
COVERED WOOD STUDDING



COVERED METAL

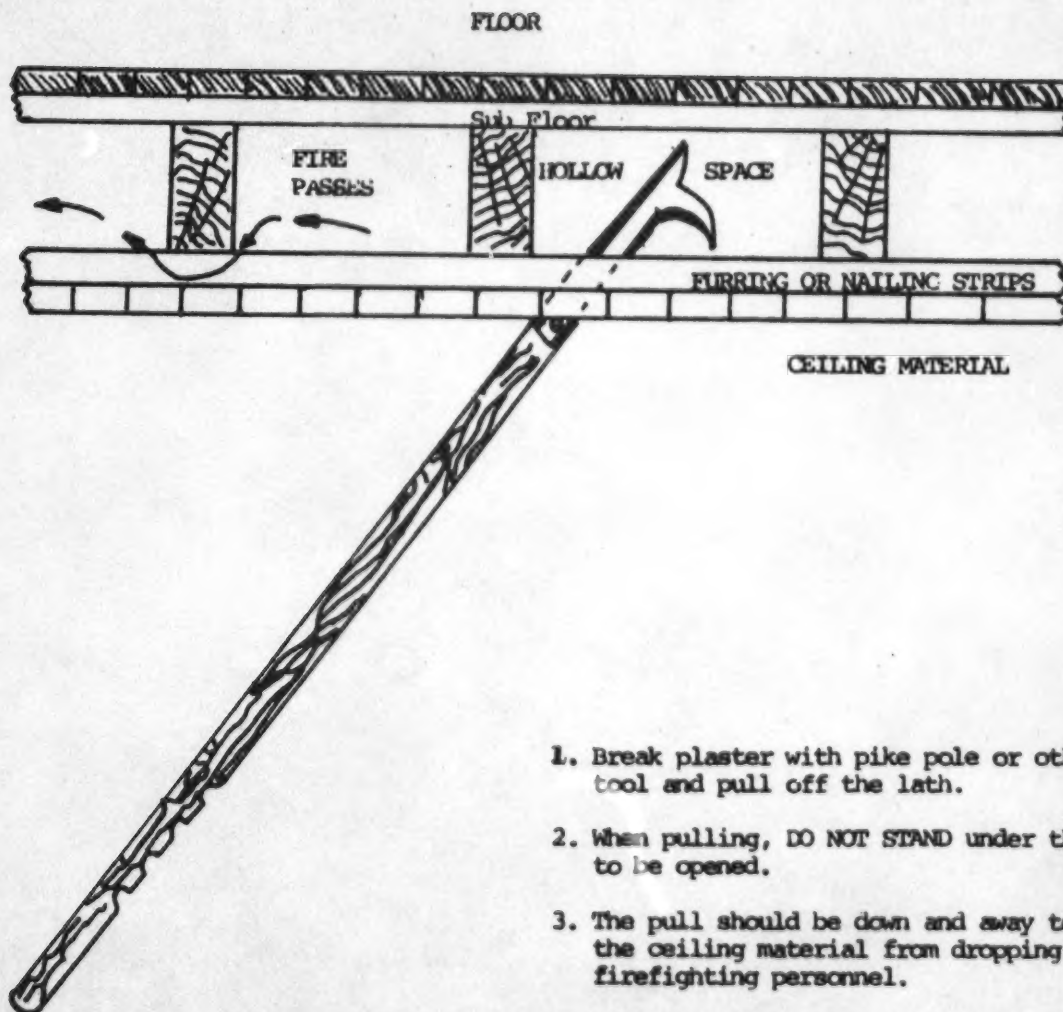


COVERED METAL STUDDING



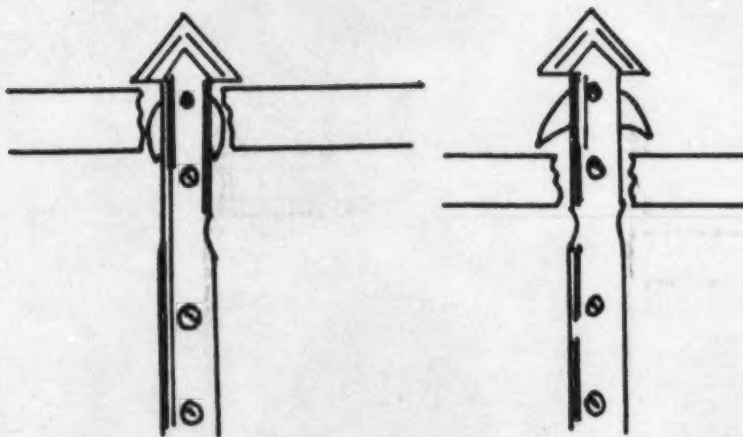
GYPSUM BLOCK

OPENING TECHNIQUES FOR CEILINGS



1. Break plaster with pike pole or other tool and pull off the lath.
2. When pulling, DO NOT STAND under the space to be opened.
3. The pull should be down and away to prevent the ceiling material from dropping on the firefighting personnel.
4. Always wear a helmet and stand between your work and an opening through which you can retreat if necessary.

PLASTER HOOKS



The plaster hook also pulls ceilings efficiently. The blades retract to pierce the ceiling, then springs cause them to expand for better pulling.

PIKE POLE

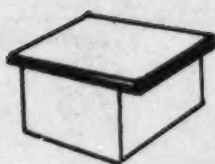


The head of the pike pole may turn after it has been forced through a plaster or other type wall.

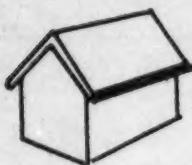
This difficulty can be eliminated by filing small notches on the pike side of the handle.

Firefighters can then keep the head lined up with the original hole.

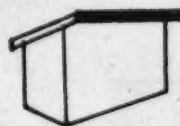
COMMON ROOF STYLES



FLAT



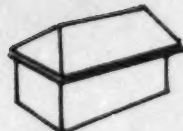
GABLE



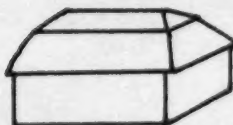
SHED



BUTTERFLY



HIP



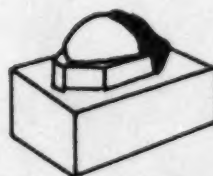
MANSARD



LANERN

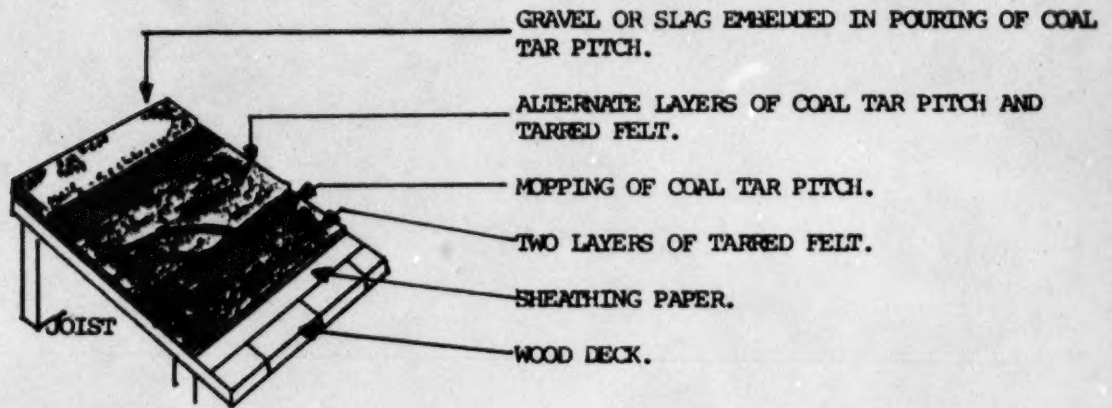


GAMBREL

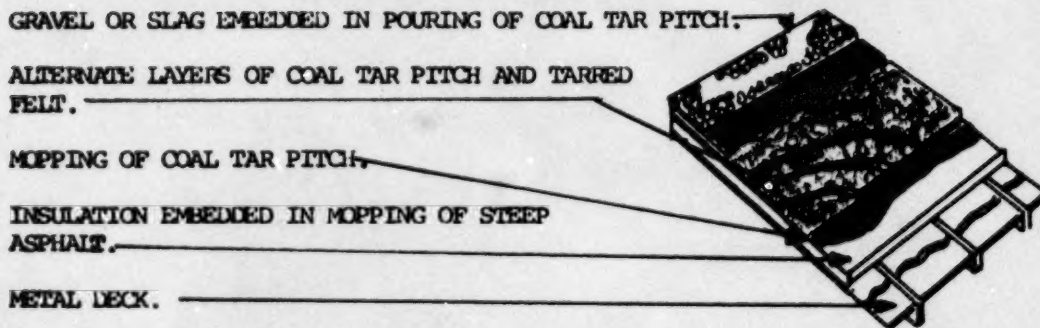


DOVE

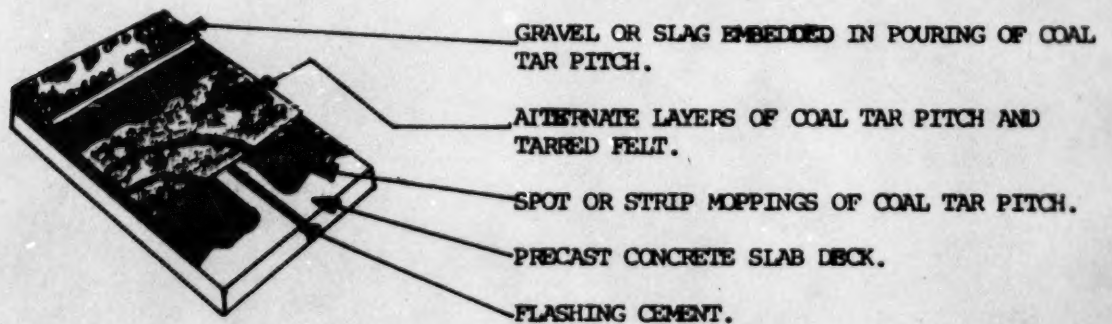
EXAMPLES OF FLAT ROOF CONSTRUCTION



WOOD PLANK



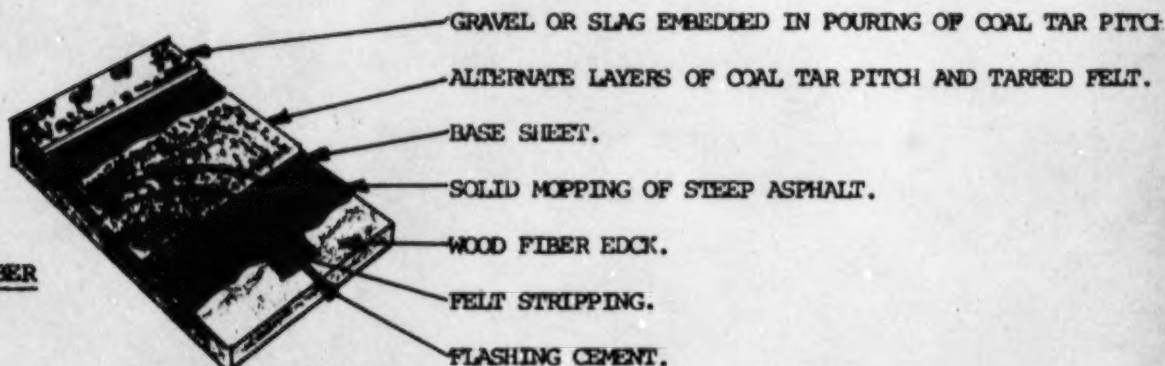
METAL DECK



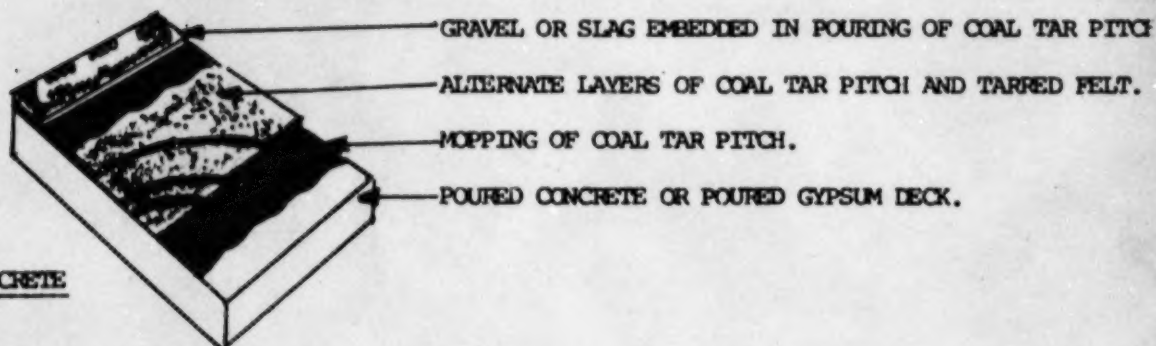
PRECAST CONCRETE

EXAMPLES OF FLAT ROOF CONSTRUCTION

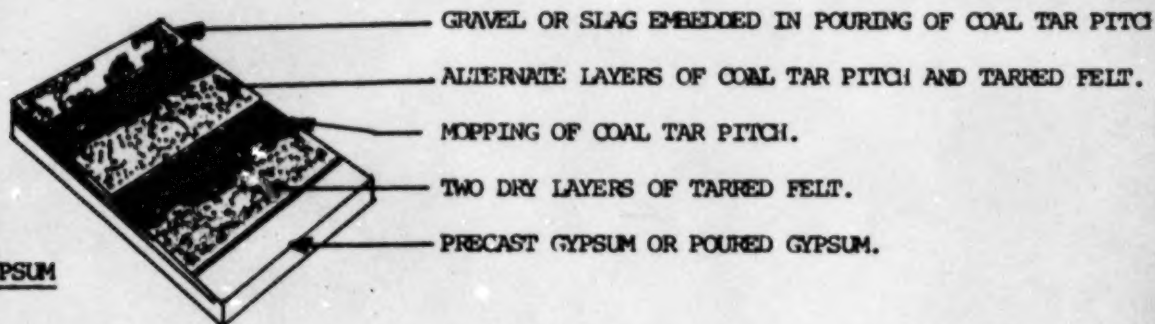
WOOD FIBER



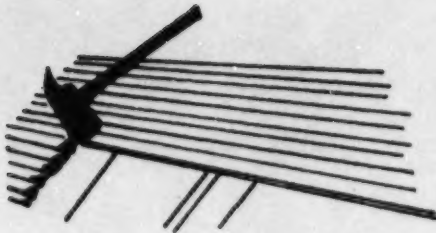
POURED CONCRETE



PRECAST GYPSUM



OPENING A WOOD JOIST OR RAFTER ROOF



- Step 1. Use the following factors to determine the location for the opening to be made.

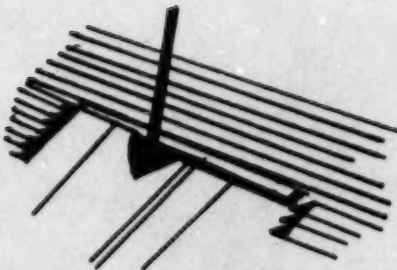
Location of Intense Fires
Highest Point on Roof
Direction of Wind
Existing Exposures
Extent of Fire
Obstructions

- Step 2. Locate roof supports by sounding with the axe.. Between the rafters and joists it will sound hollow and the axe will bounce. When near or on top of a support it will sound dull and solid.

- Step 3. Mark off the location for the opening by scratching a line on the roof surface with the pick head.

- Step 4. Remove the built-up roof material or metal by cutting the material and using the pick head to pull the material out of the way.

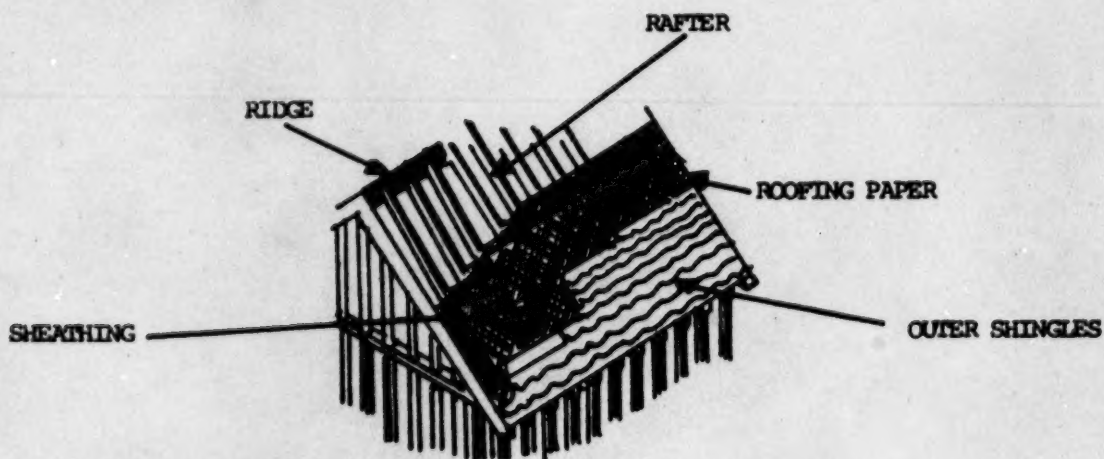
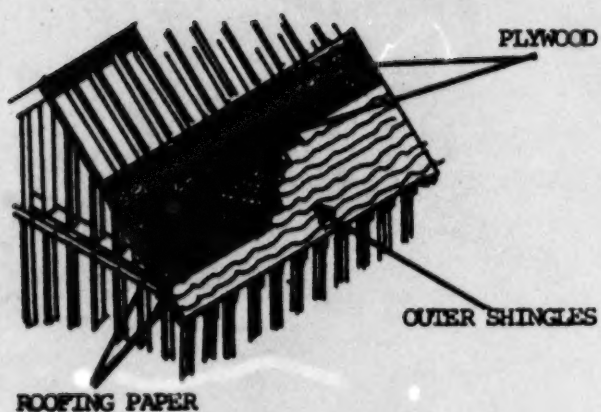
- Step 5. Cut the wood decking diagonally alongside the joist toward the hole. DO NOT cut the joist. Cutting alongside a joist permits the blows to have a solid base to avoid bouncing.



- Step 6. Use short strokes when chopping. If an axe must be swung high to apply more force, check for overhead obstructions and other firefighters. If the blade becomes wedged, care should be taken to avoid breaking the axe handle.

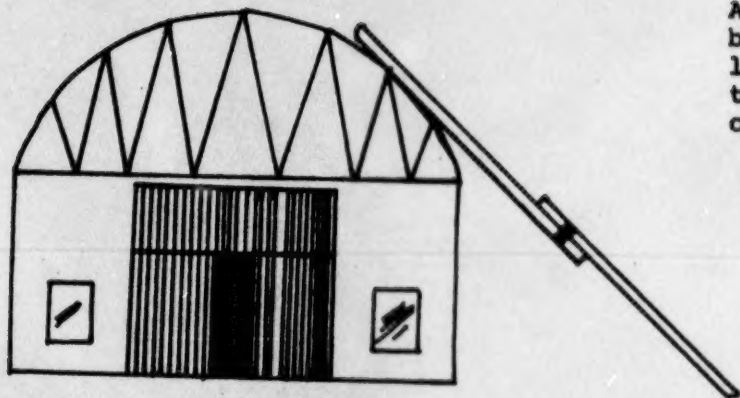
- Step 7. After ALL cuts have been made, pry up the roof boards with the pick end of the axe. After an opening has been cut in the roof, push the blunt end of a pike pole, plaster hook or some other suitable tool through the roof opening to open the ceiling(s) below.

TYPICAL PITCHED ROOF CONSTRUCTION



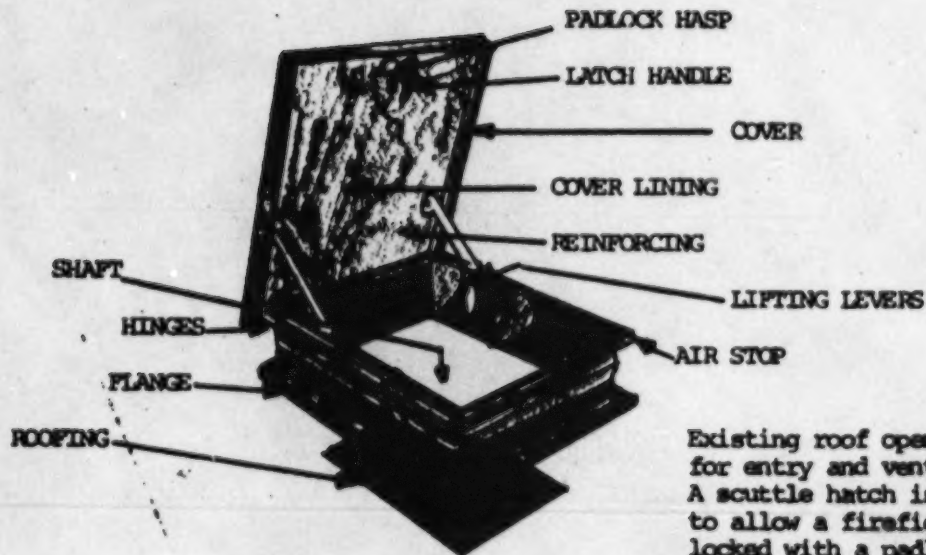
USE A ROOF LADDER WHEN CLIMBING A PITCHED ROOF

ARCHED ROOFS

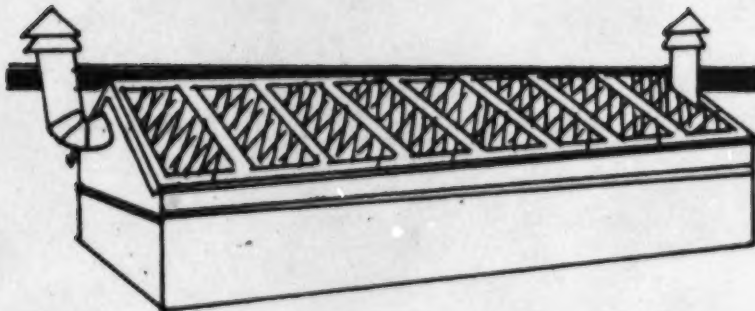


An ordinary roof ladder cannot be secured on an arched roof. A long ground ladder may work, but the necessary angle may make operations more difficult.

EXISTING ROOF OPENINGS

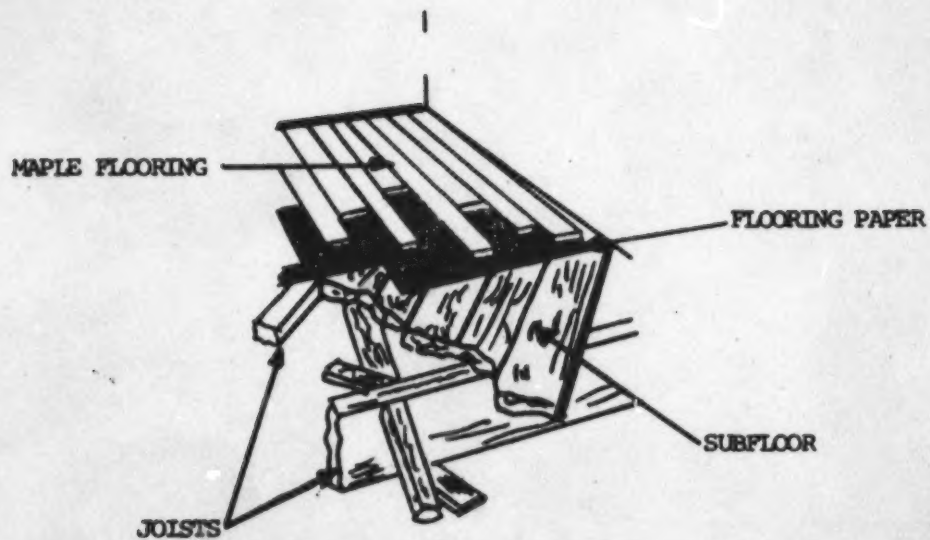


Existing roof openings should be used for entry and ventilation when present. A scuttle hatch is usually large enough to allow a firefighter to pass. It may be locked with a padlock.



Wired glass skylights provide a larger opening, but the glass may be difficult to shatter. Remove the frame instead if possible.

STANDARD FRAME FLOOR CONSTRUCTION



STANDARD SLAB CONSTRUCTION

